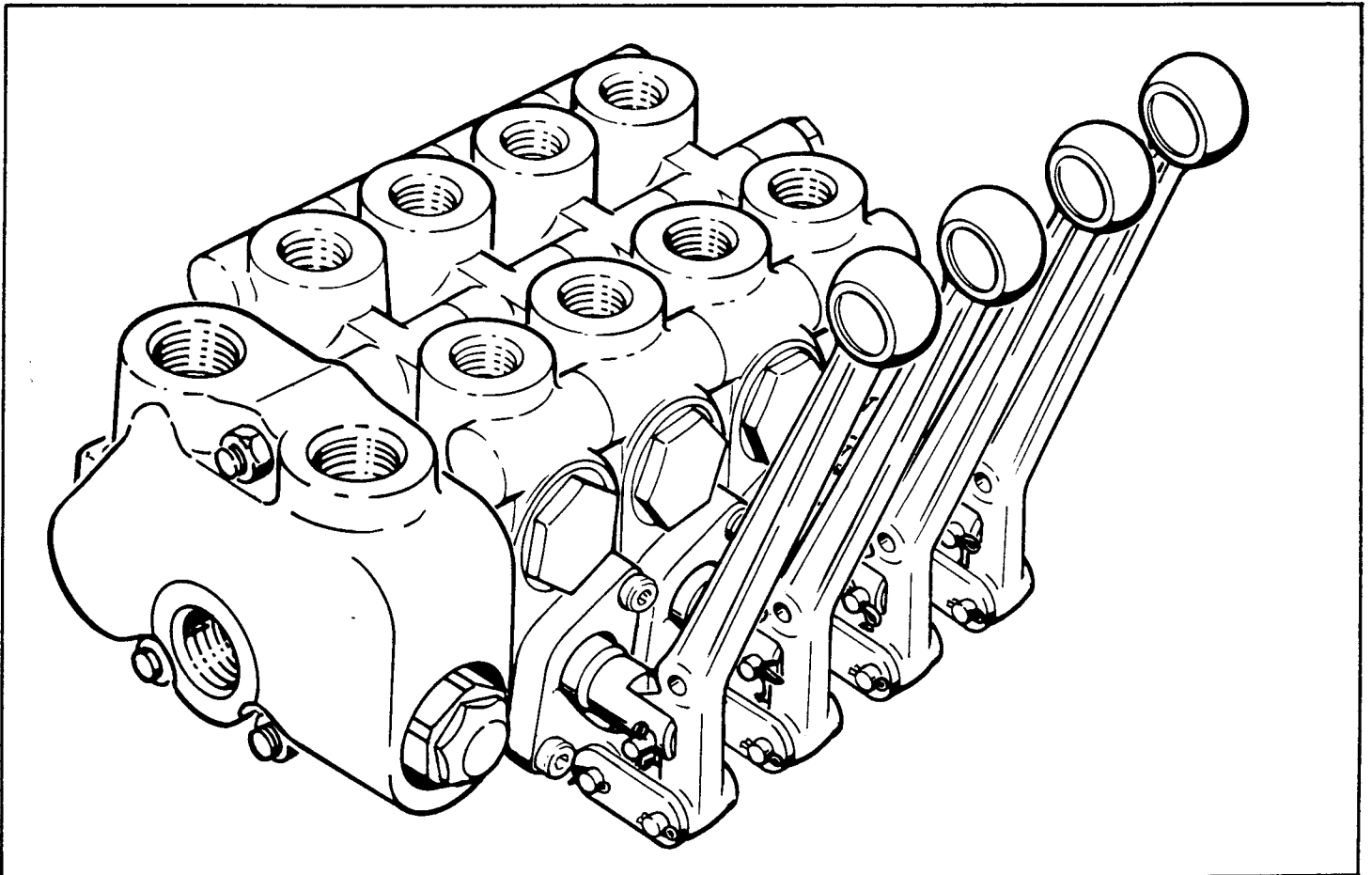


GRESEN[®]

HYDRAULIC COMPONENTS

MODEL V20 SECTIONAL BODY DIRECTIONAL CONTROL VALVE

SERVICE and PARTS MANUAL



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SECTION I

INTRODUCTION

This manual contains pertinent step-by-step maintenance instructions plus parts ordering information and a complete part and service kit listing for the Model V20 Directional Control Valve.

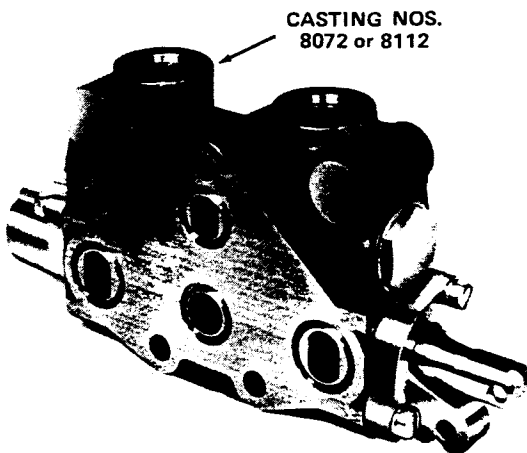
If further assistance is required, contact:

Your Gresen Distributor or Representative.

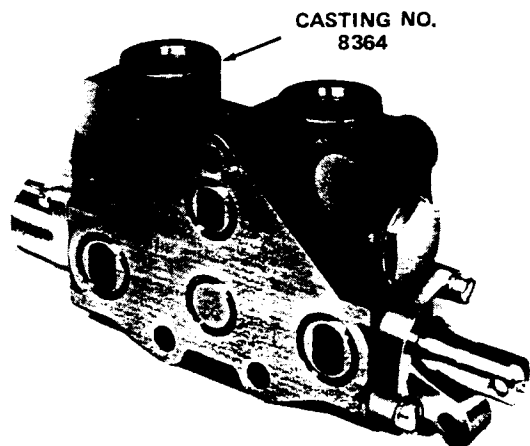
WARNING

There is a visual similarity between Gresen's Model V20 Directional Control Valve covered in this manual and Gresen's V20C Closed Center Directional Control Valve.

Work sections for these two valve assemblies should *NEVER* be *intermixed* or *interchanged* without prior consultation with the factory. Intermixing a V20C closed center work section with a V20P or V20T work section will convert the complete valve bank to closed center operation and in some cases, could render the valve assembly inoperable and cause damage to components in the hydraulic circuit.



Model V20P or V20T
Work Section.



Model V20C
Work Section.

SECTION II

DESCRIPTION

Gresen Model V20 Directional Control Valves may be purchased with five different valve sections, plus various options, to meet the desired job specification.

The following paragraphs describe the five sections and any options with reference to the parts illustrations in Section IV in this manual.

Gresen's Models CP, CT, V20P and V20T work sections are interchangeable and may be intermixed within a complete directional control valve assembly. When Models CP or CT work sections are used, maximum pressure is limited to 2500 PSI.

Table 2-1. Casting Part Numbers

Description	Model CP/CT	Model V20
Parallel Center Section	7697-	8072-
Tandem Center Section	7698-	8112-
Series Center Section	—	11483-
V20R Center Section	—	10954-
V20R Tandem Center Section	—	10762-
LO Center Section	6732-	11571-
Mid-Inlet Section	6825-	6825-
Inlet Cover (Standard)	1815-	8398-
Inlet Cover (Top Ports)	1862-	8398-
Inlet Cover w/Flow Control	7736-	7736-
Outlet Cover (End Outlet)	6770-	6770-
Outlet Cover (Top Outlet)	8644-	8644-

Numbers shown for sections and covers are base casting numbers, not ordering numbers. Refer to Parts Ordering Information, Section III, for ordering information.

MODEL V20P

4-WAY, 3-POSITION VALVE SECTION

This section provides control of double-acting cylinders without the floating action plus hydraulic motor start, stop and reverse control where free-wheeling is NOT required. Cylinder ports are blocked in neutral position.

MODEL V20P

3-WAY, 3-POSITION VALVE SECTION

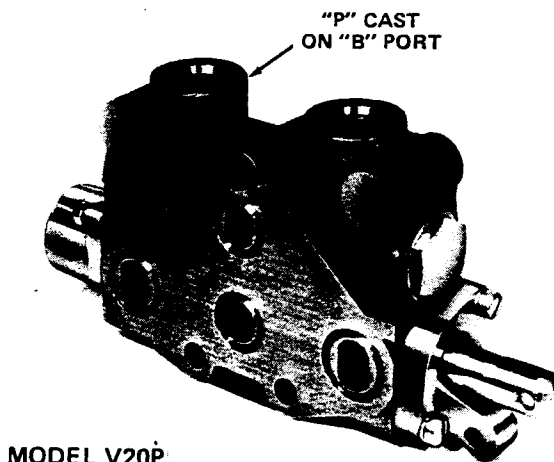
This section provides control of single acting cylinders or start and stop of non-reversible hydraulic motors where free-wheeling of motor is not required. The cylinder port is blocked in neutral position.

MODEL V20P

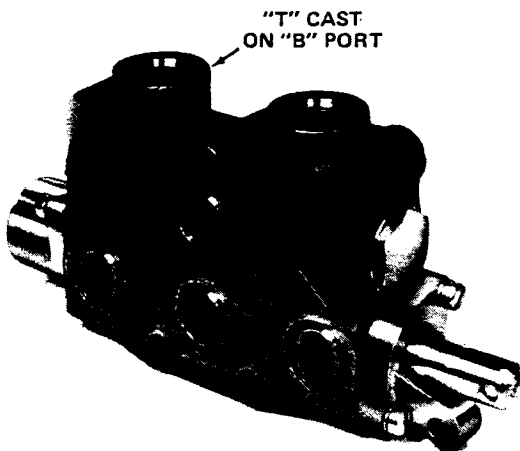
4-WAY, 3-POSITION VALVE SECTION WITH PRESSURE DETENT RELEASE

This section provides automatic return to neutral position as soon as work cycle is completed.

The spool is held in either power position by a detent assembly until released. When pressure in the power circuit reaches a predetermined setting, the detent assembly releases and the centering spring returns the spool to neutral.



MODEL V20P



MODEL V20T

Figure 2-1. Model V20P (Parallel Circuit) and Model V20T (Tandem Circuit) Work Sections.

MODEL V20P

4-WAY, 4-POSITION, FLOAT VALVE SECTION

This section provides control of double-acting cylinders requiring a floating action such as: loaders, dozers, snow plows, etc.

Incorporated into the valve section is a 4-position float positioner. Three positions are standard double-acting with spring return to neutral. The fourth position is detented to hold control in float (both cylinder ports open to tank).

MODEL V20-T

TANDEM (PRIORITY) SECTION, 3-WAY, 4-WAY, OR 4-WAY FLOAT

This section allows any upstream valve sections to have priority. Only when the upstream sections are in neutral or metering position will oil be available to this section.

SPOOL ACTION OPTIONS:

A. SPRING RETURN TO NEUTRAL, (Standard).

Spool will return to neutral position from A or B power position when handle is released.

B. "R" OPTION, Detent with Spring Return to Neutral

Can be used on either 3-way, 4-way or free flow spool. Has detent position for either spool "in", spool "out" or 2-position detent for both spool "in" and spool "out" positions, with spring return to neutral position.

Recommended for hydraulic motors where the motor operates continuously in one direction (detent position) with only intermittent operation in the opposite direction.

C. "D" Option, 3-Position Detent

Used when manual placement (NO spring return to neutral) is desired in any of three positions—spool in, spool out, and neutral. An optional detent stop (part no. 1889-001) may be used to convert spool action to "neutral" and "spool out" positions only or for "neutral" and "spool in" position only, thus giving a two-position spool action.

D. "A" OPTION, Spring Extended Spool

This feature eliminates spring return to neutral. The spring returns to the spool "out" position only, usually used for cam operation of spool.

Customer must supply cam follower mechanism.

HANDLE ASSEMBLIES

Provides choice of either horizontal or vertical handle assemblies.

INLET and OUTLET COVERS (Refer to Section III, Parts Ordering Information)

CYLINDER PORT CHECK and RELIEF VALVE OPTION (Refer to Figures 4-30 through 4-42)

SECTION III

MAINTENANCE

REPLACING, ADDING OR REMOVING SECTION ASSEMBLIES

NOTE

For clarification, we shall call the inlet cover containing the main relief the left side of the valve assembly. Refer to Figure 3-1.

1. Before disassembly, it is suggested that each valve section be marked numerically to avoid incorrect reassembly.
2. Remove three assembly stud nuts (Item 32, Figure 4-1) from the left end section using a 9/16" thin wall socket.
3. Remove valve sections by sliding from assembly studs (Item 1, Figure 4-1).

4. If valve sections are to be added or removed, use the proper length assembly studs from the chart below.

No. of Sections	Assembly Stud Kit No.*
1	K-6104-D
2	K-6105-D
3	K-6106-D
4	K-6107-D
5	K-6108-C
6	K-6109-C
7	K-6110-C
8	K-6111-C
9	K-6112-C

*Each Kit contains 3 assembly studs and 3 9310-006 hex nuts.

NOTE: When using 8644 Right End Cover, add one section to assure proper stud length.

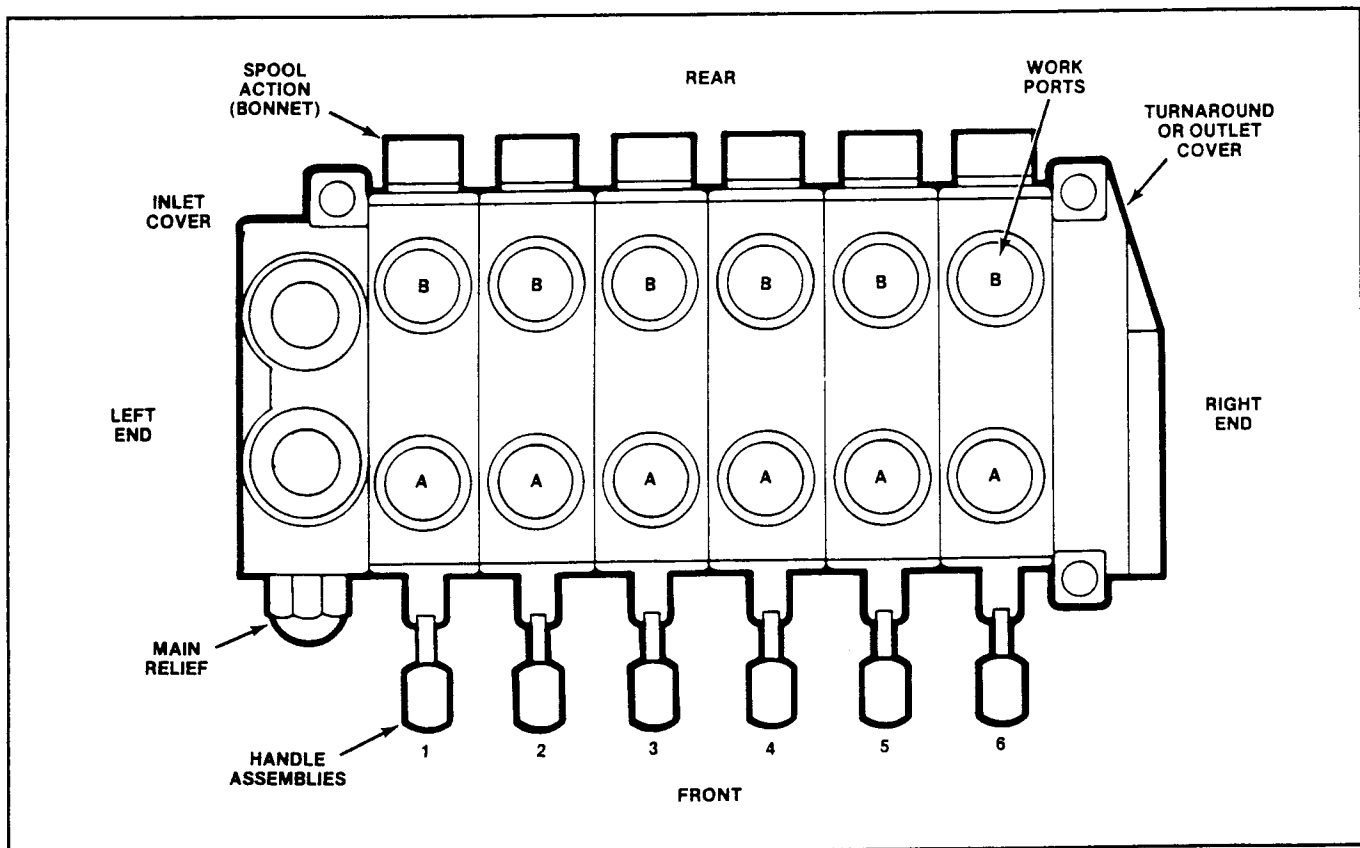


Figure 3-1. Schematic-View of Typical Control Valve Assembly.

NOTE

Use assembly nuts (part no.9310-006), 3 required, with all assembly studs. **NO LOCK WASHERS!** All studs are stress-proof material and should be replaced only with original equipment replacement parts.

5. Thoroughly clean O-ring counterbores and ground surfaces of each section.
6. Replace the four O-rings. For closed center sections use two 21733-001 (new) and two 21857-001 seals per section. For open center, use three 21733-001 and one 21857-001. For closed center, load sensing, sections use two 21857-001, two 21733-001 and one 21866-001. Buna-N seals are standard. For optional viton seals, see cross-reference chart on pg. 4-37. See chart on pg. 3-2 for old seal numbers.
7. Replace valve sections on assembly studs in the same order in which they were removed. O-ring counterbores should be to the left when facing "A" port-end of valve.

NOTE

Use care in replacing valve sections to avoid dislodging O-rings from counterbores.

8. When all valve sections are positioned on assembly studs, replace stud nuts and tighten evenly to 32 ft. lbs. [43 Nm] torque.

CAUTION

If stud nuts are not tightened to the proper torque, valve spools may bind or stick, or cause section seals to extrude.

REPLACING SPOOL SEALS

Valve sections and covers are identified by numbers cast into the body. Refer to Table 2-1, page 2-0.

Figure 3-2 shows spool assembly—less the complete handle assembly. When handle bracket is furnished, retainer plates and screws (items 1 and 4, Figure 3-2) are omitted. Seal assembly is retained by the handle bracket which will also retain the optional wiper seal.

1. Remove bonnet assembly parts from back of valves and keep in order of disassembly.

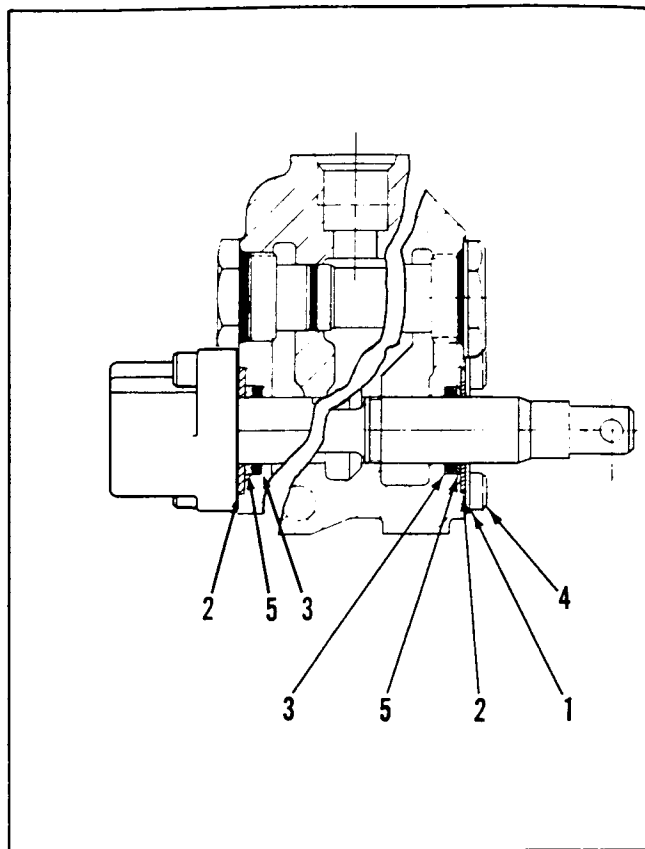


Figure 3-2. Spool Seal Assembly

2. Remove all parts connected to the spool on the front of the valve, either the complete handle bracket assembly, or the seal retainer assembly if a handle bracket is not furnished.

NOTE

DO NOT REMOVE the spool as the seals can be replaced externally. Prevent spool from turning or moving by inserting a screw driver through clevis slot, or running a rod through the pin hole and using as a handle. **DO NOT** hold the spool with a wrench. This will destroy the finish.

3. Remove retainer plate (Item 1, Figure 3-2), retainer plate washers (Item 2), back-up washers (Item 5), and spool seals (Item 3).
4. Thoroughly clean counterbore.
5. Lightly oil new seals. Slide over valve spool and insert in seal counterbore.

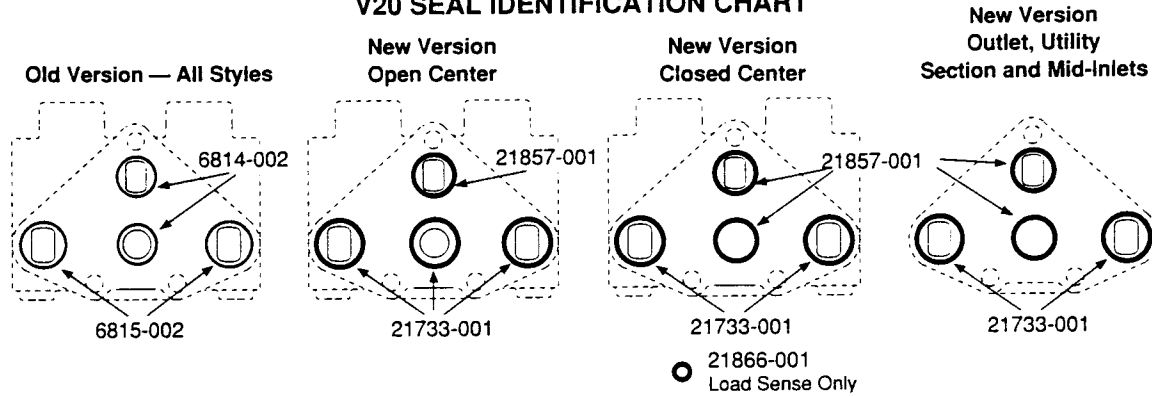
PARTS ORDERING INFORMATION

As of April 1, 1991, the section seals for the V20 changed. The new versions have larger cross section (old was .070, new is .103) and different configurations for open center and closed center sections. The old design utilized the same seals for all versions (two .801 I.D. and two .926 I.D.). The new design uses one configuration for open center (three .924 I.D. and one

.799 I.D.) and another configuration for closed center, load sensing and all outlet covers (two .924 I.D. and two .799 I.D., with one .237 I.D. for load sensing).

The following chart is provided to aid in selection of the proper seals. It is important to note that the seal kits include all O-rings (new and old), therefore there will be some left unused.

V20 SEAL IDENTIFICATION CHART



The following section seals are included in the Kits:

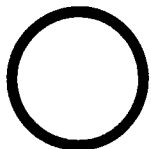
Standard Kits		Viton Kits	
Old	New	Old	New
(2)6814-002	(2)21857-001	(2)7450-001	(2)9003-117
(2)6815-002	(3)21733-001	(2)7451-001	(3)9002-119
Load sensing kits (additional seals)			
(1)8316-001	(1)21866-001	(1)9002-011	(1)9002-108

Seal kit changes.

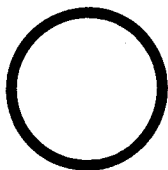
K-6121 Section Seal Kit, One Section
 K-6027 Complete Seal Kit, 3 or 4 Way Section
 K-6028 Complete Seal Kit, 4 Way Float Section
 K-6209 Complete Seal Kit, Series 3 or 4 Way Section
 K-6210 Complete Seal Kit, Series 4 Way Float Section
 K-6154 Complete Seal Kit, Load Sensing 4 Way Float
 K-6155 Complete Seal Kit, Load Sensing 3 or 4 Way Section
 K-6156 Section Seal Kit, Load Sensing-One Section
 K-6160 Viton Section Seal Kit, One Section

* Complete Seal Kits include spool seals and O-rings for check plugs.

OLD



6814-002....STD
 7450-001....VITON

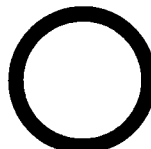


6815-002....STD
 7451-001....VITON

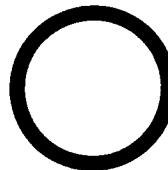


8316-001....STD
 9002-011....VITON

NEW



21857-001....STD
 9003-117....VITON



21733-001....STD
 9002-119....VITON



21866-001....STD
 9002-108....VITON

THESE SEALS ARE NOT INTERCHANGEABLE. OLD AND NEW STYLE SECTIONS MAY BE USED IN THE SAME ASSEMBLY PROVIDED THE CORRECT SEALS ARE USED FOR EACH SECTION.

INLET COVERS — Two Inlet Covers are available. All inlet covers are machined to accept the Model WH differential poppet relief cartridge or Model RP51 pilot-operated relief cartridge. If an outlet port is not used in the inlet cover, the outlet port in the right end cover of the valve must be used for tank return line. The inlet cover may be machined

with several different combinations of port sizes and locations. NPT and SAE threads cannot be intermixed in the same casting.

Use the following porting charts to arrive at the desired machining modification number.

Inlet Cover, Part No. 8398

Port Location	NPT*						SAE					
End Inlet	1/2	3/4	1/2	—	3/4	—	12	12	—	10	10	—
Top Inlet**	1/2	3/4	1/2	1/2	3/4	3/4	12	12	12	10	10	10
Top Outlet**	1/2	3/4	1/2	1/2	3/4	3/4	12	12	12	10	10	10
End Outlet	1/2	3/4	—	—	—	—	12	—	—	10	—	—
SAE 4 Gage Port	—	—	—	—	—	—	No	Yes	Yes	No	Yes	No
1/4" Gage Port	No	No	No	Yes	Yes	No	—	—	—	—	—	—
Machining Modification Number	018	014	019	012	023	016	008	025	013	024	021	002

* Pipe ports not recommended for pressures over 2000 PSI [138 bar].

** Top ports are cored and will be plugged if end inlet and outlet are specified.

Inlet Cover, Part No. 7736 With Flow Control

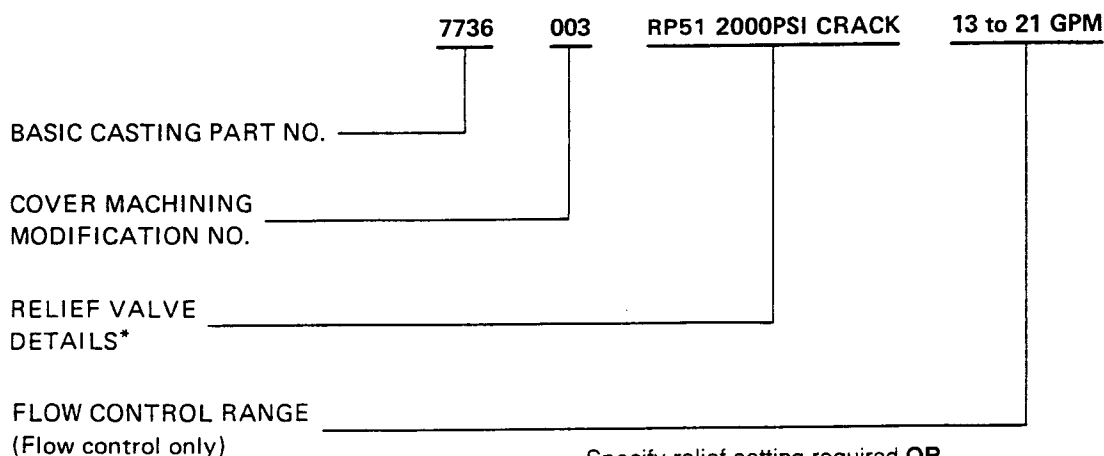
Inlet cover, part number 7736, is equipped with an adjustable flow control assembly. Refer to Figure 4-42 for complete parts breakdown.

A Power Beyond option in this cover will allow excess flow to be used downstream only when upstream valve is activated and controlled flow is being used. When upstream valve is in neutral position, all flow is directed through the open center.

Port Location		NPT*	SAE		
End In		3/4	10	12	10
Top In		3/4	10	12	10
End Out		3/4	10	12	12
Machining Modification Number	Without Power Beyond	011	016	009	—
	With Power Beyond	013	—	012	017

* Pipe ports not recommended for pressures over 2000 PSI [138 bar].

ORDERING EXAMPLE FOR INLET COVERS WITH FLOW CONTROL



Flow Control Ranges

(For inlet cover with flow control only)

- 3 to 16 GPM [11 to 60 litres/min]
- 8 to 25 GPM [30 to 95 litres/min]
- 13 to 21 GPM [49 to 79 litres/min]

*Specify model number of relief valve to be installed; either WH or RP51.

Specify relief setting required **OR**
Specify "NR" (no relief) plug installed **OR**
Specify plastic shipping plug, installed in relief cavity.

Example: If a left inlet cover with a SAE 10 inlet, a SAE 12 outlet, with RP51 relief set at 2000 PSI [138 bar] crack and flow control range of 13-21 GPM [49-79 litres/min] is required, order 7736-003-RP51 2000 PSI [138 bar] crack — 13-21 GPM [49-79 litres/min].

OUTLET COVERS — Two Outlet Covers are available.

Outlet covers may be machined with several different combinations of port sizes and locations. NPT and SAE threads cannot be intermixed in the same casting. If an outlet port is not used in the outlet cover, the outlet port in the left end cover must be used for tank return line.

Use the following porting charts to arrive at the desired machining modification number.

Outlet Cover, Part No. 8644

Standard machining provides an outlet port (top, end or bottom) for open center applications. Closed center or top power beyond options are available. For power beyond, the top power beyond port is machined, and the core between the open center and exhaust passages is tapped and plugged. Plugging the power beyond port (and the internal core) converts the cover to closed center.

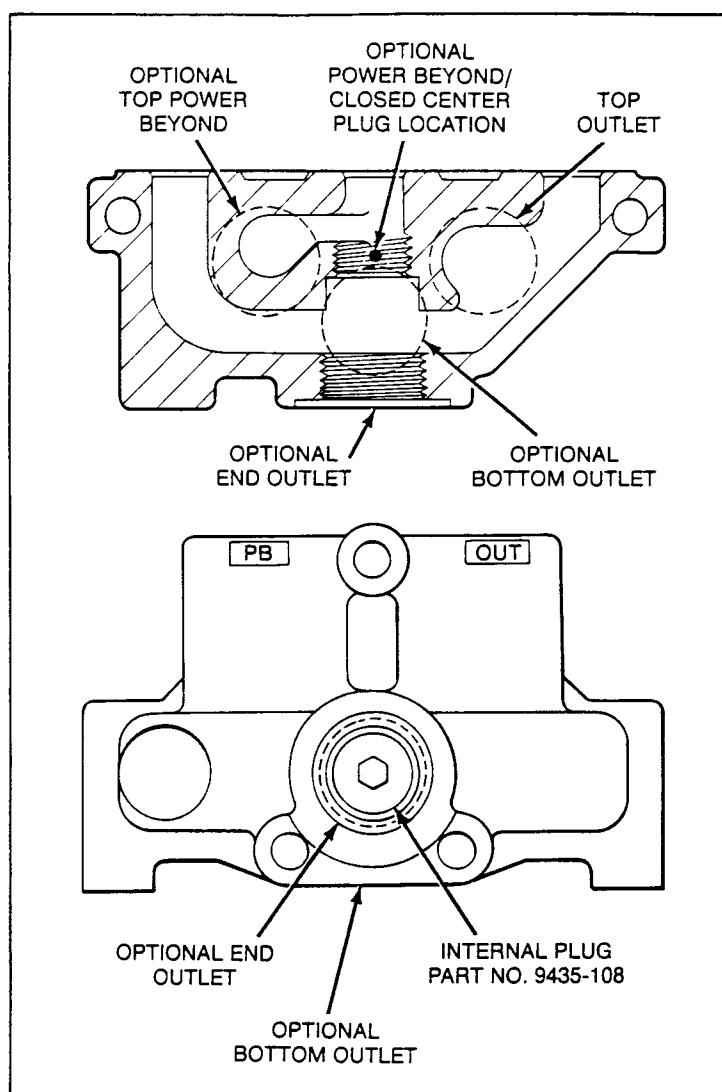


Figure 3-3. Outlet Cover Part No. 8644

Port Location	NPT			SAE				
Top Outlet*	3/4	3/4	3/4	12	12	12	12	12
End Outlet	—	—	3/4	—	—	12	12	12
Bottom Outlet	—	3/4	—	—	12	—	—	12
Top Power Beyond	—	—	3/4	—	—	10	12	12
Machining Modification Number	008	005	006	007	010	012	004	013

*Top outlet is cored and will be plugged if end or bottom outlet is specified.

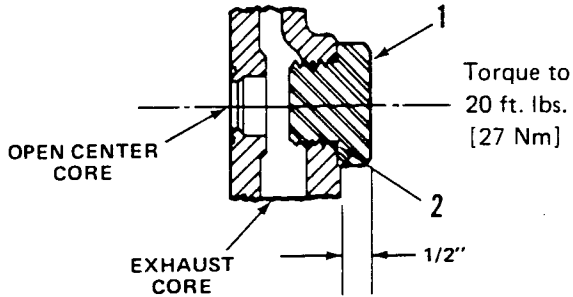
Outlet Cover, Part No. 6770.

Port Size Available	End Outlet Port Only	Machined for Power Beyond Sleeve, Closed Center Plug or Conversion Plug.	
		With End Outlet	No End Outlet
1/2-14 NPT	6770-004	6770-009	6770-007
3/4-14 NPT	6770-001	6770-005	
SAE 10 (7/8-14 UNF)	6770-002	6770-006	
SAE 12 (1-1/16 12 UNF)	6770-003	6770-013	

6770 OUTLET COVER OPTIONS

No. 1727 Conversion Plug

Provides for conversion from "Power Beyond" or "Closed-Center" usage to "Open-Center" or vice-versa.



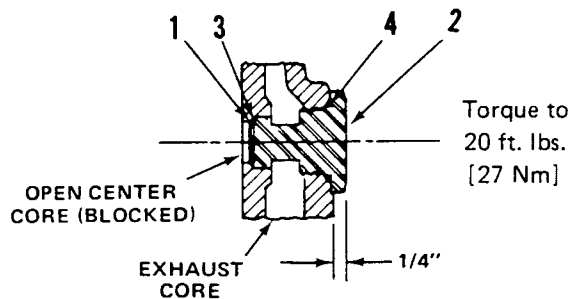
SERVICE KIT K-6016

(Contains 1 Each of Items 1 and 2)

Item No.	Part No.	Description	No. Required
1	1727-001	Conversion Plug	1
2	2709-001*	O-Ring Seal	1

No. 1830 Closed-Center Plug Option

Provides a "Closed-Center" System by plugging the open-center flow passage. It is normally used with a variable displacement pump.



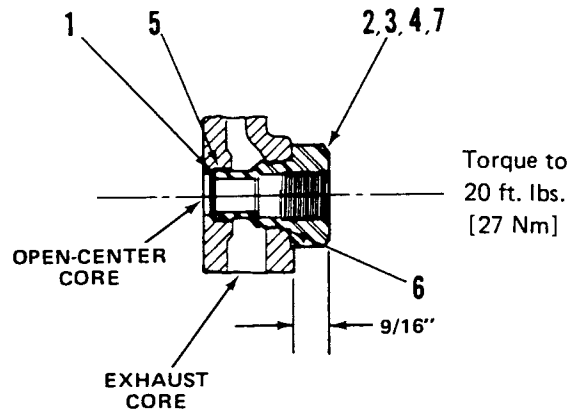
SERVICE KIT K-6015

(Contains 1 Each of Items 1, 2, 3 and 4)

Item No.	Part No.	Description	No. Required
1	1721-001*	Seal	1
2	1830-001	Closed-Center Plug	1
3	9020-017	Back-Up Washer	1
4	2709-001*	O-Ring Seal	1

No. 1833, 1835 or 1836 Power Beyond Sleeve Options

Provides for proper hook-up of an additional valve "down-stream". The Power Beyond Sleeve prevents subjecting the exhaust core of the valve to back pressure.



SERVICE KITS

K-6017-B* (1/2 NPT – Contains 1 Each of Items 1, 2, 5, 6)

K-6018-B* (SAE 8 – Contains 1 Each of Items 1, 3, 5, 6)

K-6019-B* (SAE 10 – Contains 1 Each of Items 1, 4, 5, 6)

K-6060-B (SAE 16 – Contains 1 Each of Items 1, 5, 6, 7)

Item No.	Part No.	Description	No. Required
1	1721-001*	Seal	1
2	1833-001	P.B. Sleeve (1/2-14 NPT)	1
3	1835-001	P.B. Sleeve SAE 8 (3/4-16 UNF)	1
4	1836-001	P.B. Sleeve SAE 10 (7/8-14 UNF)	1
5	9020-017	Back-Up Washer	1
6	2709-001*	O-Ring Seal	1
7	7706-001	P.B. Sleeve SAE 16 (1" Tube) Male Fitting	1

NOTE

To convert from Power Beyond usage to "Open-Center" usage, NEVER ATTEMPT TO PLUG THE POWER BEYOND SLEEVE, as this would convert to "Closed-Center" Valve.

ORDERING EXAMPLE
FOR RIGHT COVER PLATE:

BASIC CASTING

COVER MACHINING
MODIFICATION

OPTION DETAILS

6770

006

Cover with SAE 8 Power
Beyond Sleeve Installed

Example: If a right cover with a SAE 10 outlet and a SAE 8 power beyond sleeve was required, then order: per the above description.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on Page 4-37.

V20P, V20T and V20S VALVE CENTER SECTIONS

The following information is necessary for proper specification for each V20P, V20T or V20S Valve Center Section:

1. Function of Section
2. Options
3. Work port sizes

4. Work port "A" Options
5. Work port "B" Options
6. Handle end Options

The chart shown below will help in identifying the Options available and the information needed for proper ordering. Refer to product catalog No. PC-1106 for complete information on options available.

CIRCUIT	PARALLEL – V20P ☐ Casting No. 8072 (See Page 2-0) TANDEM – V20T ☐ Casting No. 8112 (See Page 2-0) SERIES – V20S ☐ Casting No. 11483 (See Page 2-0)
FUNCTION OF SECTION	FUNCTION OF SECTION (Check one for each section) • 3-Way (Work port on handle end will be plugged) ☐ • 4-Way ☐ • 4-Way Float (K) ☐ • _____ ☐
OPTIONAL FEATURES	ADDITIONAL OPTIONS • Free Flow (F) ☐ • 3-Position Detent (D) ☐ • _____ ☐ • _____
WORK PORT SIZES	"A" and "B" WORK PORT SIZES 3/8, 1/2 NPT; SAE 8, 10
WORK PORT "A" OPTIONS	OPTIONS AVAILABLE (Specify) • Relief (RC or RCA*) _____ • Anti-Cavitation (A-C) _____ • Combination Relief and Anti-Cavitation (CRA) _____ Specify Relief Setting, Crack or Full Flow *RCA cannot be used with valve handle or bracket.
WORK PORT "B" OPTIONS	OPTIONS AVAILABLE (Specify) • Relief (RC or RCA*) _____ • Anti-Cavitation (A-C) _____ • Combination Relief and Anti-Cavitation (CRA) _____ Specify Relief Setting, Crack or Full Flow *RCA cannot be used with valve handle or bracket.
HANDLE-END OPTIONS	Location: "A" Work Port End ☐ "B" Work Port End ☐ Handle Type: No. 1802, Vert. ☐ No. 3249, Horiz. ☐ Less Complete Handle Assy (LCHA) ☐ Less Handle Only (LHO) ☐ Handle Bracket Only (HBO) ☐ Bracket: No. 1801 ☐ No. 7355 ☐ Rotate 180° From Standard ☐ Float Section: Pull Handle to Float ☐ Push Handle to Float ☐ Heavy Duty Retainer ☐ Spool Protector Boot ☐ Spool Wiper ☐

SECTION IV PARTS LISTING

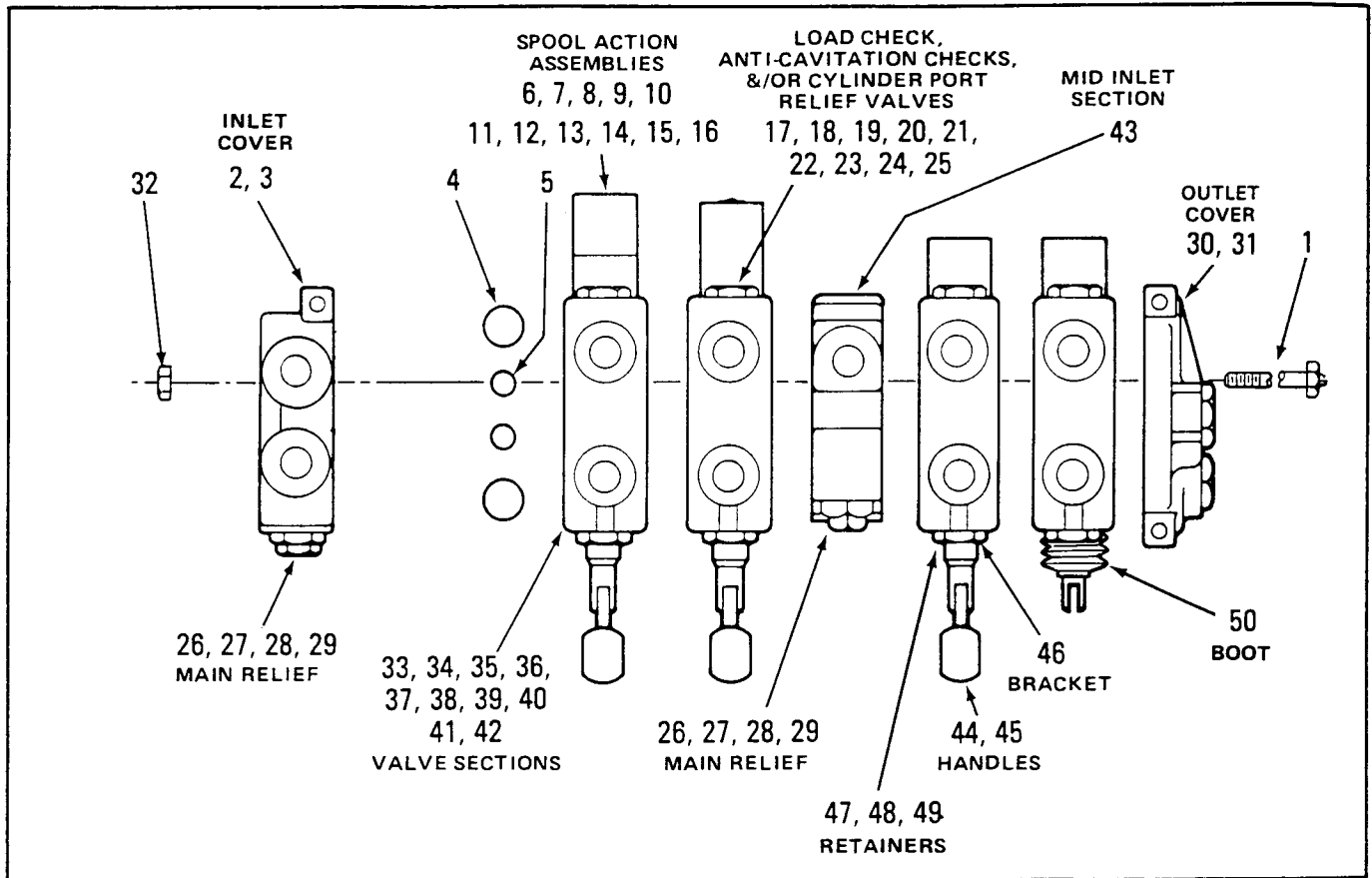


Figure 4-1. Model V20 Directional Control Valve, Typical Main Assembly.

MODEL V20 DIRECTIONAL CONTROL VALVE, TYPICAL MAIN ASSEMBLY

Item No.	Part No.	Description	Quantity Per Assembly
1	K-6104-D	STUD KIT, 1-Section	1
	K-6105-D	STUD KIT, 2-Section	1
	K-6106-D	STUD KIT, 3-Section	1
	K-6107-D	STUD KIT, 4-Section	1
	K-6108-C	STUD KIT, 5-Section	1
	K-6109-C	STUD KIT, 6-Section	1
	K-6110-C	STUD KIT, 7-Section	1
	K-6111-C	STUD KIT, 8-Section	1
	K-6112-C	STUD KIT, 9-Section	1
2	8398-	COVER, Left (Refer to Page 3-3)	1
3	7736-	COVER, Left, with flow control (Refer to Page 3-3 and Figure 4-43)	1
4	21733-001*	O-RING, Exhaust, Large (new)	**
	6815-002*	O-RING, Exhaust, Large (old)	**

Each Stud Kit
Contains 3
Assembly Studs
and 3 Stud Nuts

Note:
Torque Stud Nuts
to 32 ft. lbs. [43.5 Nm]

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

**All old versions include two exhaust and two small O-rings. All new open center versions include three large and one small O-ring. Other new versions including outlet, utility section and mid-inlets contain two of each.

MODEL V20 DIRECTIONAL CONTROL VALVE, TYPICAL MAIN ASSEMBLY (Continued)

Item No.	Part No.	Description	Quantity Per Assembly
5	21857-001*	O-RING, Pressure, Small (new)	**
	6814-002*	O-RING, Pressure, Small (old)	**
	21866-001*	O-RING, Load Sensing (new)	**
	8316-001*	O-RING, Load Sensing (old)	**
6		POSITIONER, Standard Spool (See Figure 4-12)	A/R
7		POSITIONER, Manual Spool (See Figure 4-13)	A/R
8		POSITIONER, Float Detent, 4-Way, 4-Position (See Figure 4-14)	A/R
9		DETENT, Option "R", With Spring Return To Neutral (See Figure 4-15)	A/R
10		DETENT, Option "D", 3-Position (See Figure 4-16)	A/R
11		SPRING EXTENDED SPOOL, Option "A" (See Figure 4-17)	A/R
12		ELECTRO-MAGNETIC SPOOL RELEASE (See Figure 4-18)	A/R
13		POSITIONER, Pressure Detent Release (See Figure 4-19)	A/R
14		POSITIONER, Rotary, Option "W" (See Figure 4-20)	A/R
15		POSITIONER, Standard Spool, V20S or V20R (See Figure 4-21)	A/R
16		POSITIONER, Float Detent, 4-Way, 4-Position, V20S (See Figure 4-22)	A/R
17		CHECK, Lockout (See Figure 4-29)	A/R
18		CHECK, Anti-Cavitation (See Figure 4-30)	A/R
19		CHECK, Anti-Cavitation, V20S (See Figure 4-31)	A/R
20		PLUG, Load Check, (See Figure 4-32)	A/R
21		PLUG, Load Check, V20S (See Figure 4-33)	A/R
22		RELIEF, Work Port, Model RC (See Figure 4-34)	A/R
23		RELIEF, Work Port, Model RCA (See Figure 4-35)	A/R
24		RELIEF/ANTI-CAVITATION CHECK, Work Port, Model CRA (See Figure 4-37)	A/R
25		RELIEF, Work Port, Model RCS (See Figure 4-38)	A/R
26		RELIEF, Main, Model WH (See Figure 4-39)	A/R
27		RELIEF, Main, Model WHA (See Figure 4-40)	A/R
28		RELIEF, Main, Model RP51 (See Figure 4-41)	A/R
29		PLUG, No Main Relief (NR) (See Figure 4-43)	A/R
30	6770-	COVER, Right (See pages 3-3 & 3-4)	1
31	8644-	COVER, Right (See page 3-3)	1
32	9310-006	NUT, Stud (Not sold separately. See Item No. 1)	
33	8072-	VALVE SECTION, 4-Way, 4-Position, Float (See Figure 4-2)	A/R
34	8072-	VALVE SECTION, 4-Way, 3-Position (See Figure 4-3)	A/R
35	8072-	VALVE SECTION, 3-Way, 3-Position (See Figure 4-4)	A/R
36	8072-	VALVE SECTION, 4-Way, 3-Position, With Pressure Detent Release (See Figure 4-5)	A/R
37	11571-	VALVE SECTION, 4-Way, 3-Position, With Pilot Operated Checks (See Figure 4-6)	A/R
38	8112-	VALVE SECTION, Tandem (See Figure 4-7)	A/R
39	10954-	VALVE SECTION, Low Pressure Drop (See Figure 4-8)	A/R
40	10762-	VALVE SECTION, Tandem, Low Pressure Drop (See Figure 4-9)	A/R
41	11483-	VALVE SECTION, Series (See Figure 4-10)	A/R
42	11483-	VALVE SECTION, Series, 4-Way, 4-Position, Float (See Figure 4-11)	A/R
43	6825-001	MID-INLET SECTION, Split Flow, Top Inlet 3/4—14 NPT	A/R
	6825-004	MID-INLET SECTION, Split Flow, Top Inlet 1/2—14 NPT	A/R
	6825-007	MID-INLET SECTION, Split Flow, Top Inlet SAE 12 (1-1/16—12 UNF)	A/R
	6825-011	MID-INLET SECTION, Split Flow, Top Inlet SAE 10 (7/8—14 UNF)	A/R
	6825-005	MID-INLET SECTION, Combined Flow, Top Inlet 3/4—14 NPT	A/R
	6825-008	MID-INLET SECTION, Combined Flow, Top Inlet 1/2—14 NPT	A/R
	6825-013	MID-INLET SECTION, Combined Flow, Top Inlet SAE 10 (7/8—14 UNF)	A/R
	6825-016	MID-INLET SECTION, Combined Flow, Top Inlet SAE 12 (1-1/16—12 UNF)	A/R
	6825-002	MID-INLET SECTION, Top Cored Hole Plugged with 3/8—18 NPT Plug	A/R
44		HANDLE ASSEMBLY, Vertical (See Figure 4-26)	A/R
45		HANDLE ASSEMBLY, Horizontal (See Figure 4-27)	A/R
46		BRACKET, Standard Handle (See Figure 4-25)	A/R
47	K-6033-B	RETAINER, Seal, Standard (See Figure 4-23)	A/R
48	K-6029-B	RETAINER, Seal, Heavy Duty (See Figure 4-24)	A/R
50	K-6056-B	BOOT ASSEMBLY, Spool Protective (See Figure 4-28)	A/R

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

**All old versions include two exhaust and two small O-rings. All new open center versions include three large and one small O-ring. Other new versions including outlet, utility section and mid-inlets contain two of each.

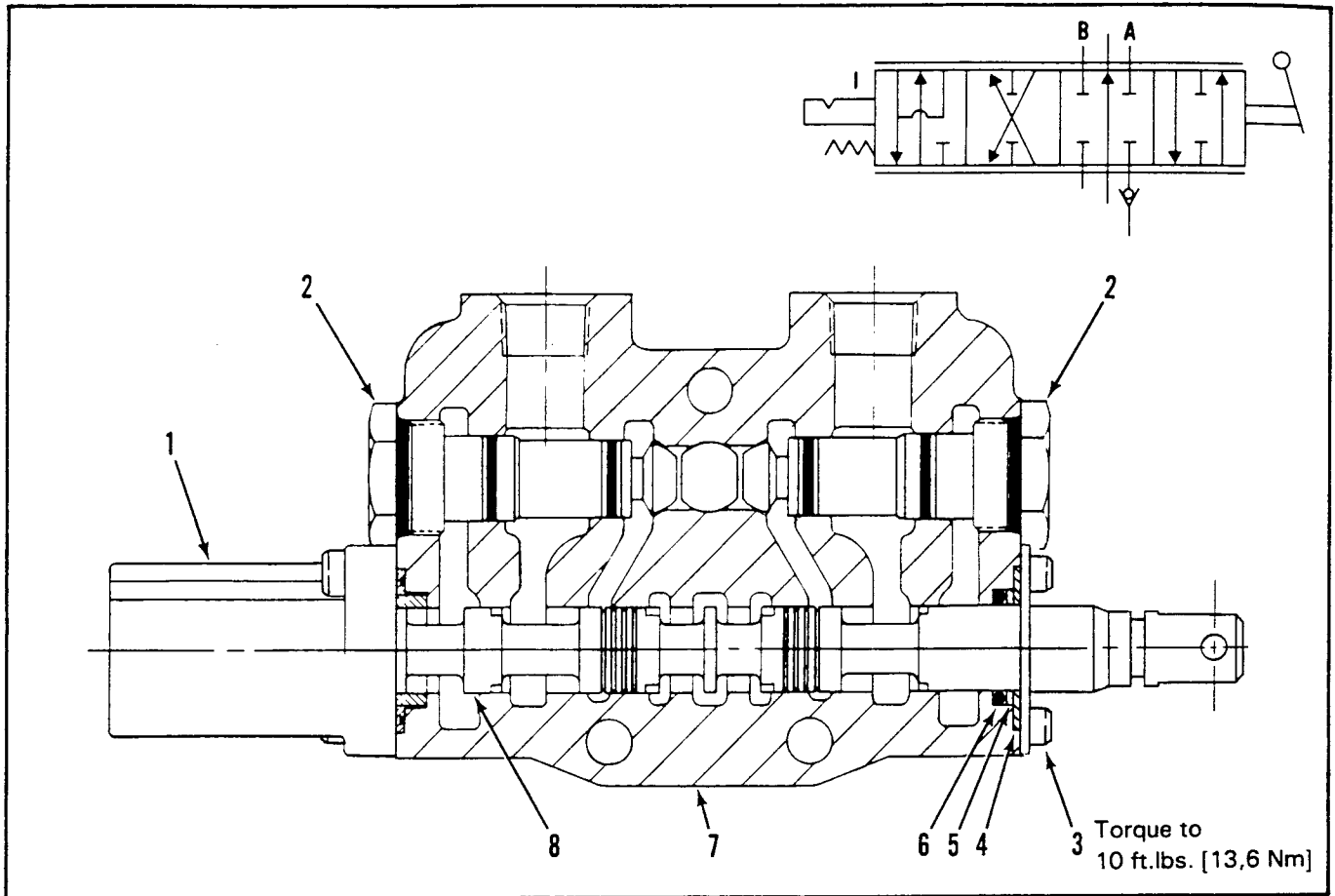


Figure 4-2. 4-Way, 4-Position Float Valve Section.

4-WAY, 4-POSITION FLOAT VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6127-A	POSITIONER, Float (See Figure 4-14)	1
2	K-6030-C	CHECK, Load (See Figure 4-32)	2
3	K-6033-B	RETAINER ASSEMBLY, Standard, Includes Screws (See Figure 4-23. See Figures 4-24 through 4-28 for optional assemblies.)	1
4	6752-001	RETAINER, Plate Washer	1
5	3265-001	WASHER, Back-Up	1
6	7700-001*	SEAL, O-Ring	1
7	8072-	HOUSING, V20 Valve	1
8	8085-001	SPOOL, Float	1

Notes:

1. Seal and washer not sold separately. Order Seal Kit No. K-6035-A.

2. These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

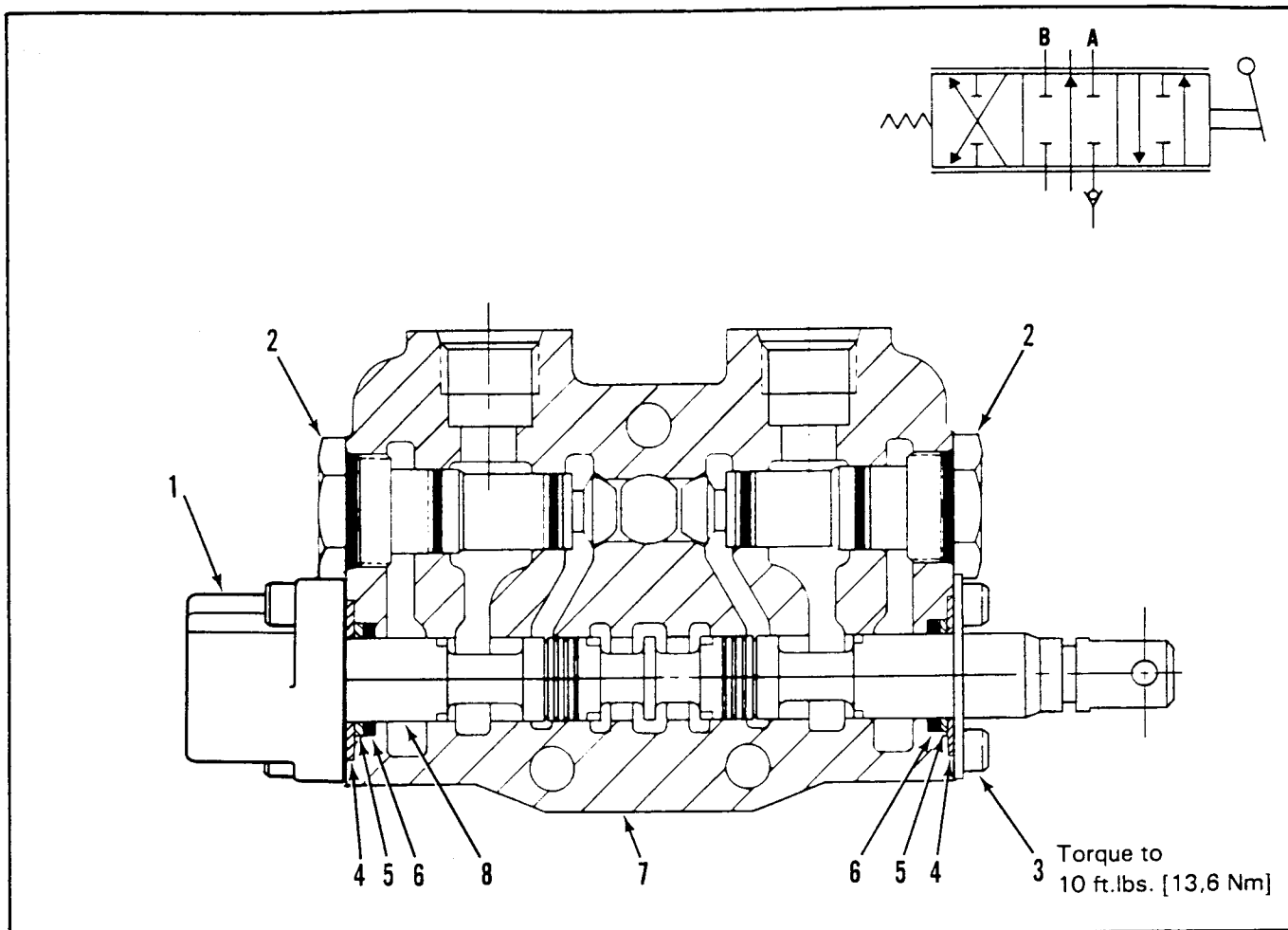


Figure 4-3. 4-Way, 3-Position Valve Section.

4-WAY, 3-POSITION VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6125-B	POSITIONER, Spool, Standard (See Figure 4-12)	1
2	K-6030-C	CHECK, Load (See Figure 4-32)	2
3	K-6033-B	RETAINER ASSEMBLY, Standard, Includes Screws (See Figure 4-23. See Figure 4-24 thru 4-28 for optional assemblies.)	1
4	6752-001	RETAINER, Plate Washer	2
5	3265-001	WASHER, Back-Up	2
6	7700-001*	SEAL, O-Ring	2
7	8072-	HOUSING, Standard	1
8	8084-001	SPOOL, 4-Way	1

Notes:

1. Seal and washer not sold separately. Order Seal Kit No. K-6035-A.

2. These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

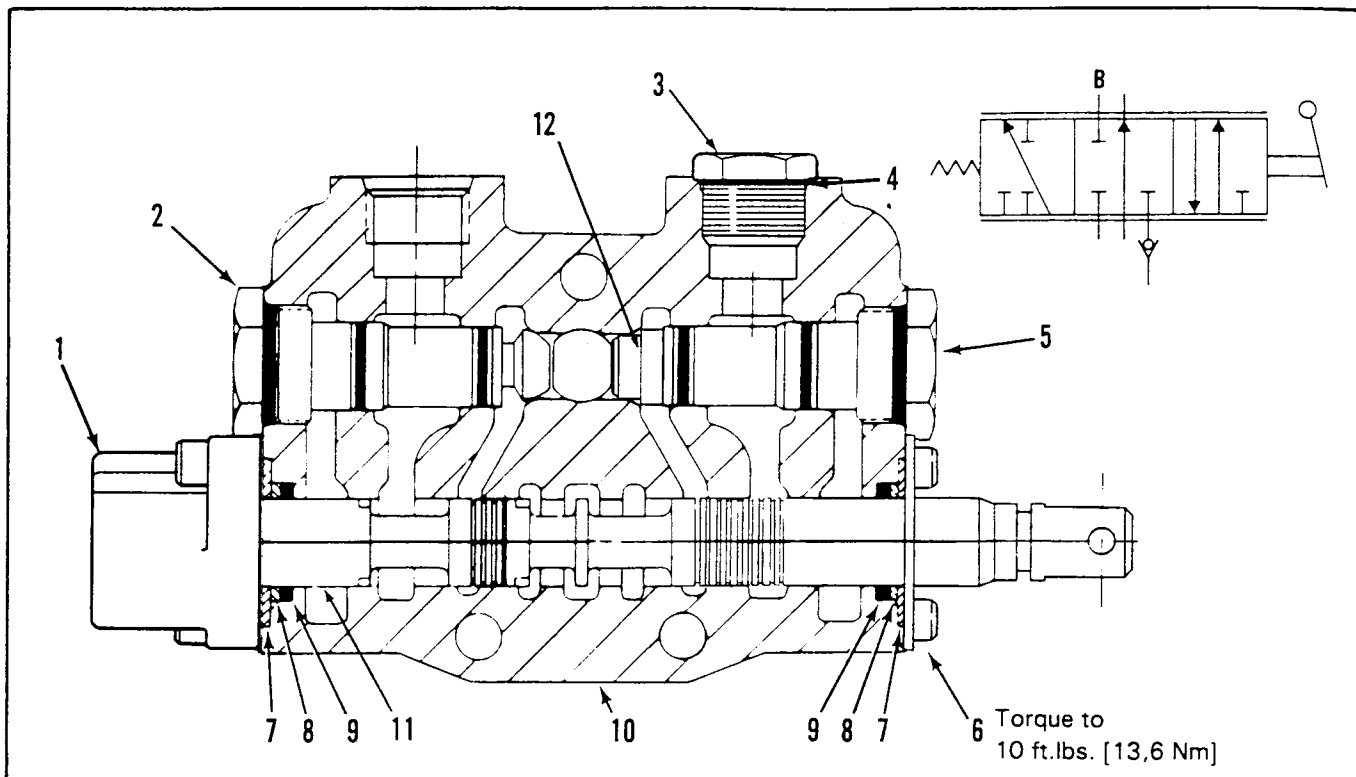


Figure 4-4. 3-Way, 3-Position Valve Section.

3-WAY, 3-POSITION VALVE SECTION

Item No.	Part No.	Description	Quantity Per Assembly
1	K-6125-B	POSITIONER, Spool, Standard (See Figure 4-12)	1
2	K-6030-C	CHECK, Load (See Figure 4-32)	1
3	2684-001	PLUG, 3-Way Conversion, SAE 8 (3/4"–16 UNF)	A/R
	1458-001	PLUG, 3-Way Conversion, SAE 10(7/8"–14 UNF)	A/R
	0073-001	PLUG, 3-Way Conversion, 3/8"–18 NPT	A/R
	0947-001	PLUG, 3-Way Conversion, 1/2"–14 NPT	A/R
4	2706-001	SEAL, O-Ring, SAE 8 Plug	A/R
	2707-001	SEAL, O-Ring, SAE 10 Plug	A/R
5	K-6030-C	PLUG, Check (Load Check and Spring are not used)	1
6	K-6033-B	RETAINER ASSEMBLY, Standard, Includes Screws (See Figure 4-23. See Figures 24 thru 4-28 for optional assemblies)	1
7	6752-001	RETAINER, Plate Washer	2
8	3265-001	WASHER, Back-Up	2
9	7700-001*	SEAL, O-Ring	2
10	8072-	HOUSING	1
11	8083-001	SPOOL, 3-Way	1
12	6754-001	PLUG, 3-Way	1

Notes:

1. Seal and washer not sold separately. Order Seal Kit No. K-6035-A.

2. These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

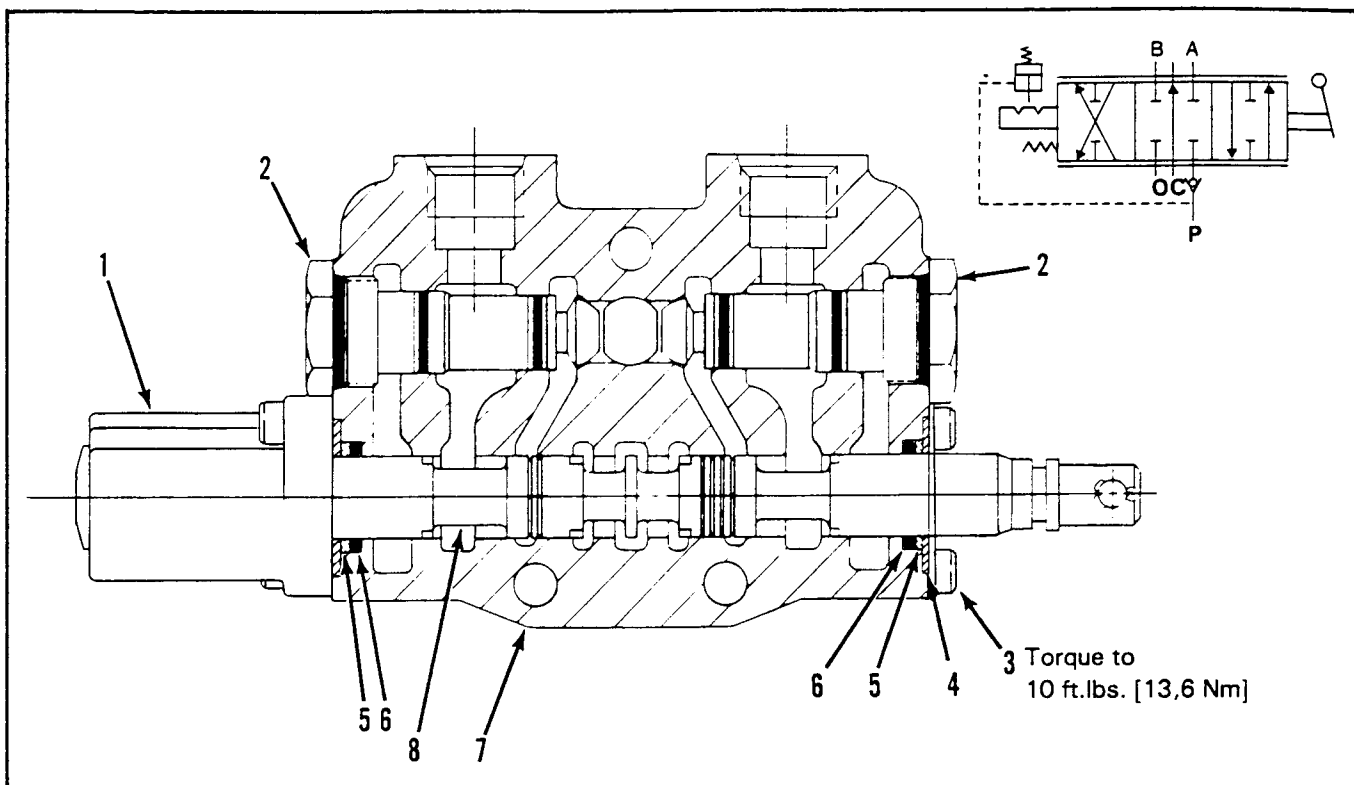


Figure 4-5. 4-Way, 3-Position Valve Section with Pressure Detent Release.

4-WAY, 3-POSITION VALVE SECTION WITH PRESSURE DETENT RELEASE (KO)

Item No.	Part No.	Description	Quantity Per Section
1		POSITIONER, Pressure Detent Release (See Figure 4-19)	1
2	K-6030-A	CHECK, Load (See Figure 4-32)	2
3	K-6033-B	RETAINER ASSEMBLY, Standard, Includes Screws, (See Figure 4-23. See Figures 4-24 thru 4-28 for optional assemblies.)	1
4	6752-001	RETAINER, Plate Washer	1
5	3765-001	WASHER, Back-Up	2
6	7700-001*	SEAL, O-Ring	2
7	8072-	HOUSING	1
8	8534-001	SPOOL, 4-Way	1

Notes:

1. Seal and washer not sold separately. Order Seal Kit No. K-6035-A.

2. These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

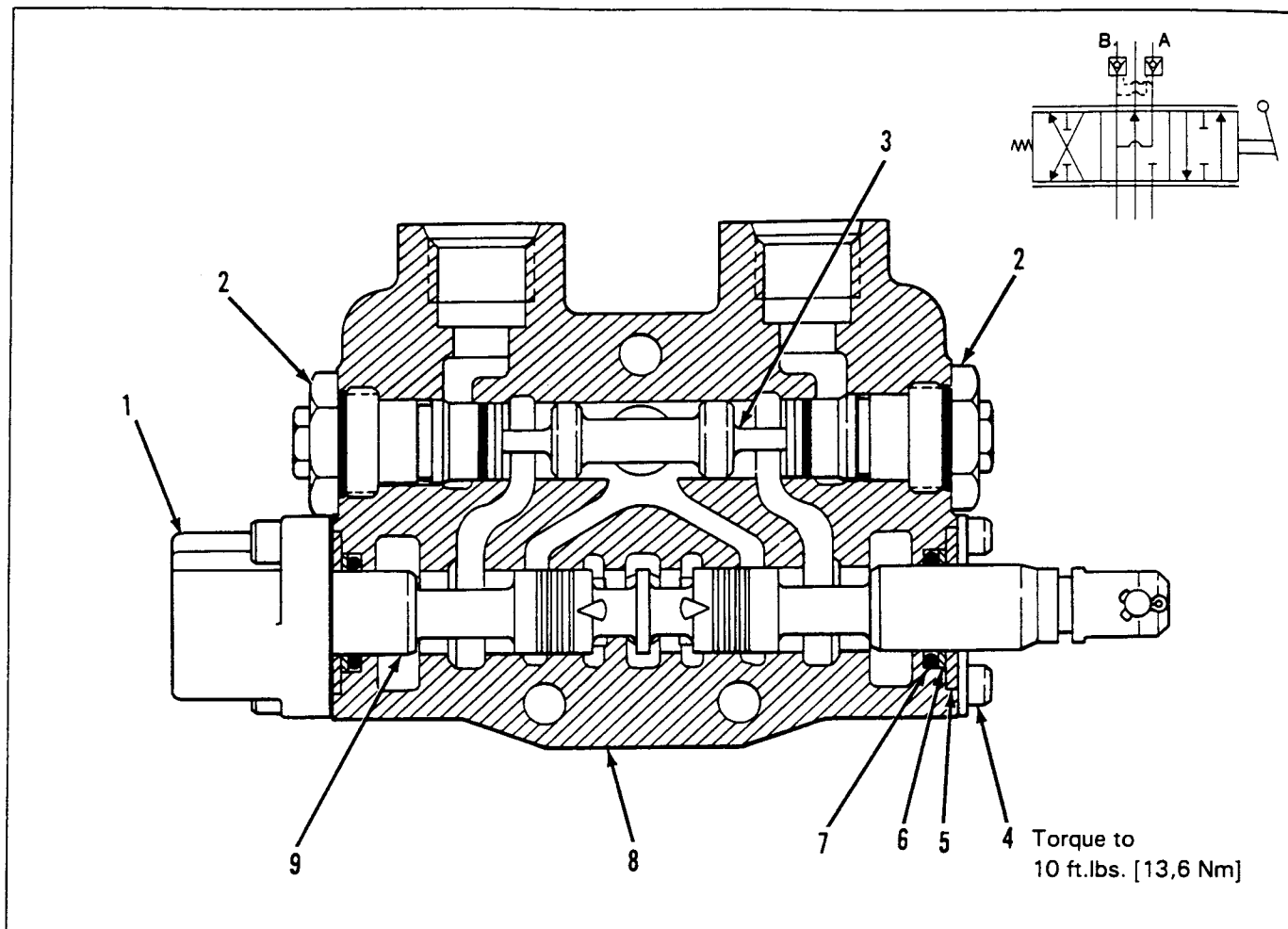


Figure 4-6. 4-Way, 3-Position Lockout Valve Section.

4-WAY, 3-POSITION LOCKOUT VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6125-B	POSITIONER, Spool, Standard (See Figure 4-12)	1
2	K-6024-D	CHECK, Lockout (See Figure 4-29)	2
3	8648-001	PISTON, Unlocking	1
4	K-6033-B	RETAINER ASSEMBLY, Standard, Includes screws (See Figure 4-23. See Figure 4-24 thru 4-28 for optional assemblies.)	1
5	6752-001	RETAINER, Plate Washer	2
6	3265-001	WASHER, Back-Up	2
7	7700-001*	SEAL, O-Ring	2
8	11571-	HOUSING, V20 Lockout	1
9	8397-001	SPOOL, Modified 4-Way Free Flow	1

Not sold separately. Order K-6035-A

See Note

Note: These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

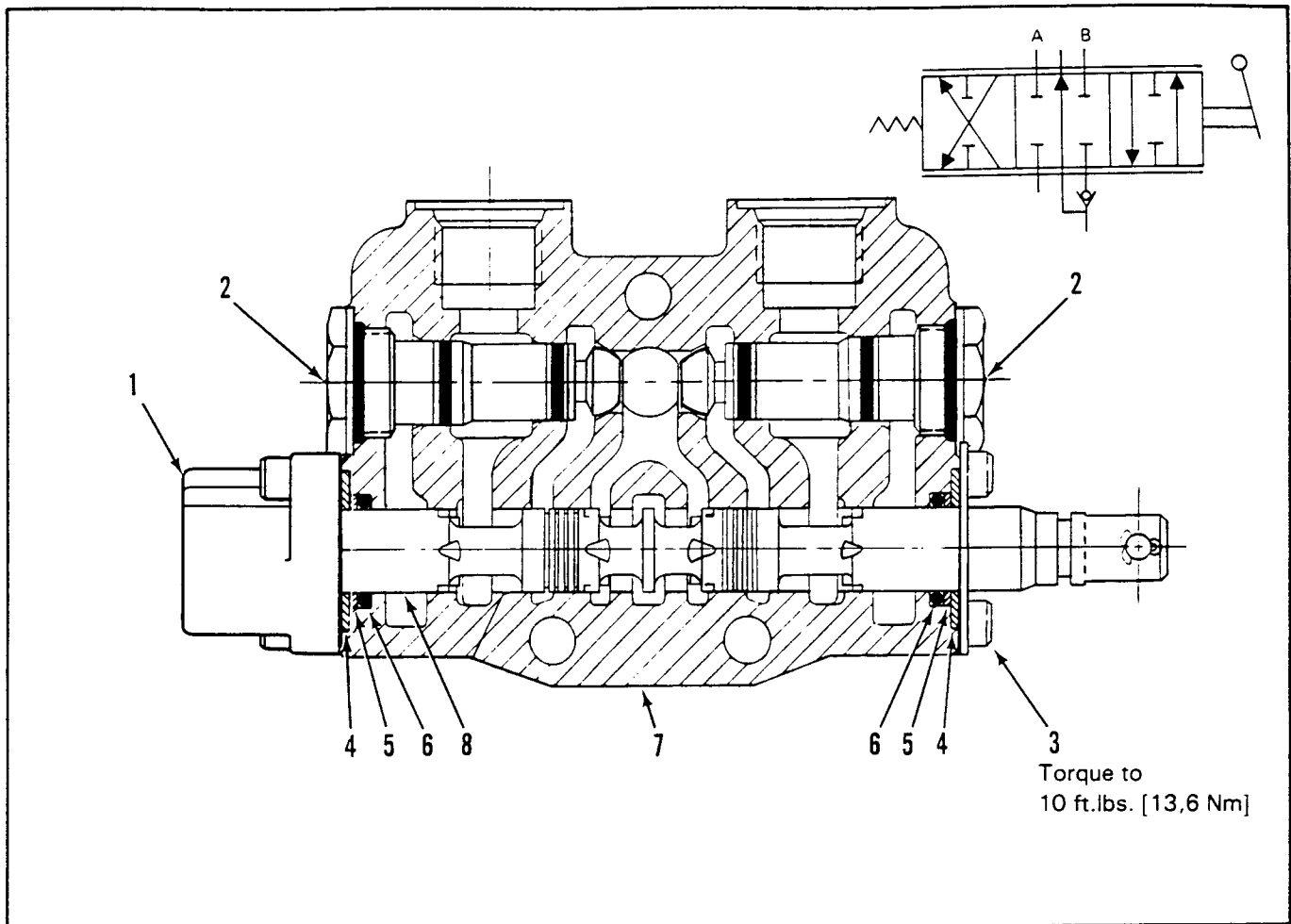


Figure 4-7. 4-Way, 3-Position Tandem Valve Section (shown with 4-way spool).

4-WAY, 3-POSITION TANDEM VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6125-B	POSITIONER, Spool, Standard (See Figure 4-12)	1
2	K-6030-C	CHECK, Load (See Figure 4-32)	2
3	K-6033-B	RETAINER ASSEMBLY, Standard, Includes Screws (See Figure 4-23. See Figures 4-24 thru 4-28 for optional assemblies.)	1
4	6752-001	RETAINER, Plate Washer	2
5	3265-001	WASHER, Back-Up	2
6	7700-001*	SEAL, O-Ring	2
7	8112-	HOUSING	1
8	8084-001	SPOOL, 4-Way	1

Notes:

1. Seal and washer not sold separately. Order Seal Kit No. K-6035-A.

2. These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

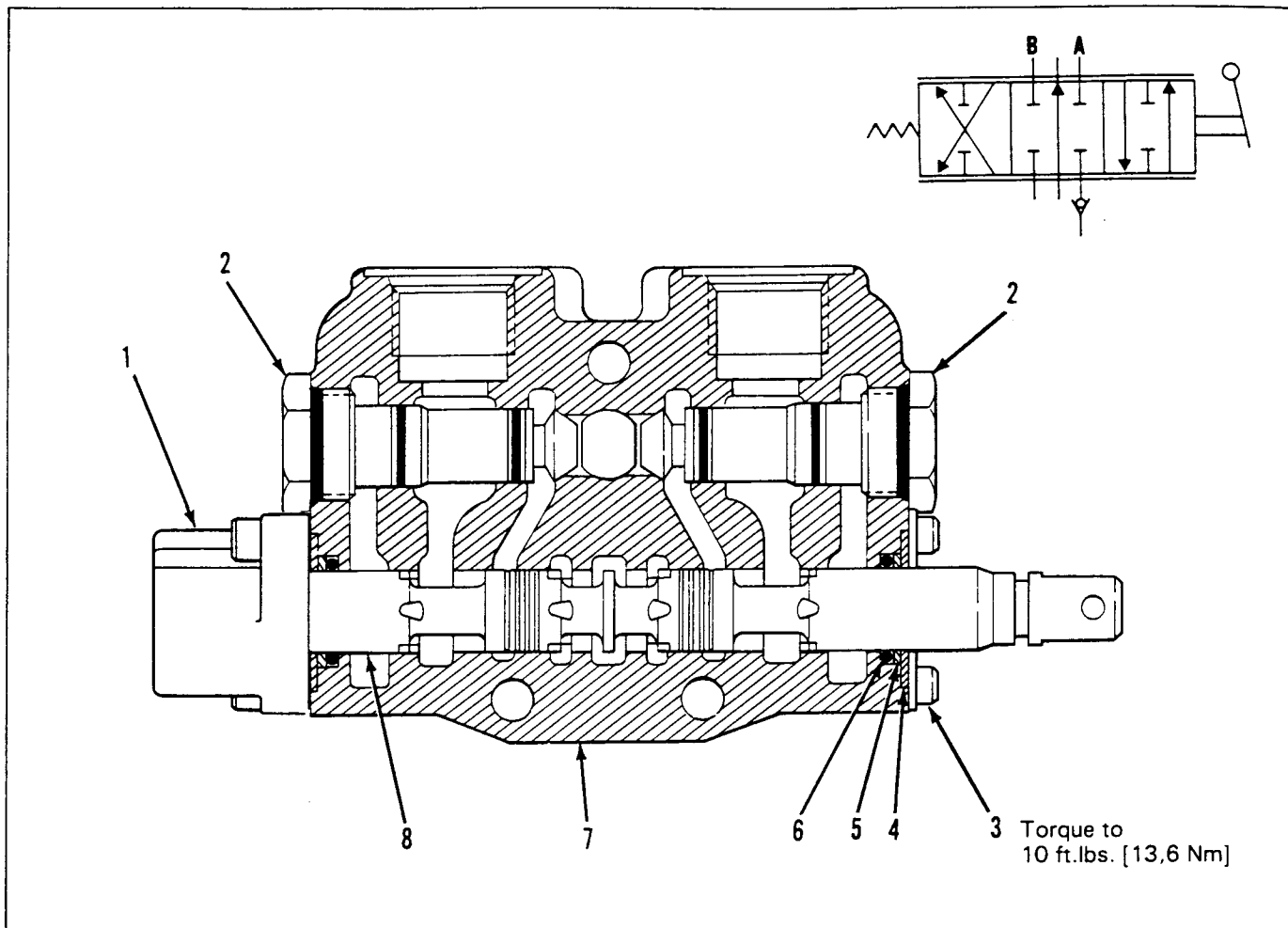


Figure 4-8. 4-Way, 3-Position, Low Pressure Drop Valve Section.

4-WAY, 3-POSITION, LOW PRESSURE DROP VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6207-A	POSITIONER, Spool, Standard (See Figure 4-21)	1
2	K-6030-C	CHECK, Load (See Figure 4-32)	2
3	K-6033-B	RETAINER ASSEMBLY, Standard, Includes screws (See Figure 4-23. See Figure 4-24 thru 4-28 for optional assemblies.)	1
4	6752-001	RETAINER, Plate Washer	2
5	3265-001	WASHER, Back Up	2
6	7700-001*	SEAL, O-Ring	2
7	10954-	HOUSING, V20 Low Pressure Drop	1
8	8084-001	SPOOL, 4-Way	1

Not Sold separately. Order K-6035-A

See Note

Note: These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

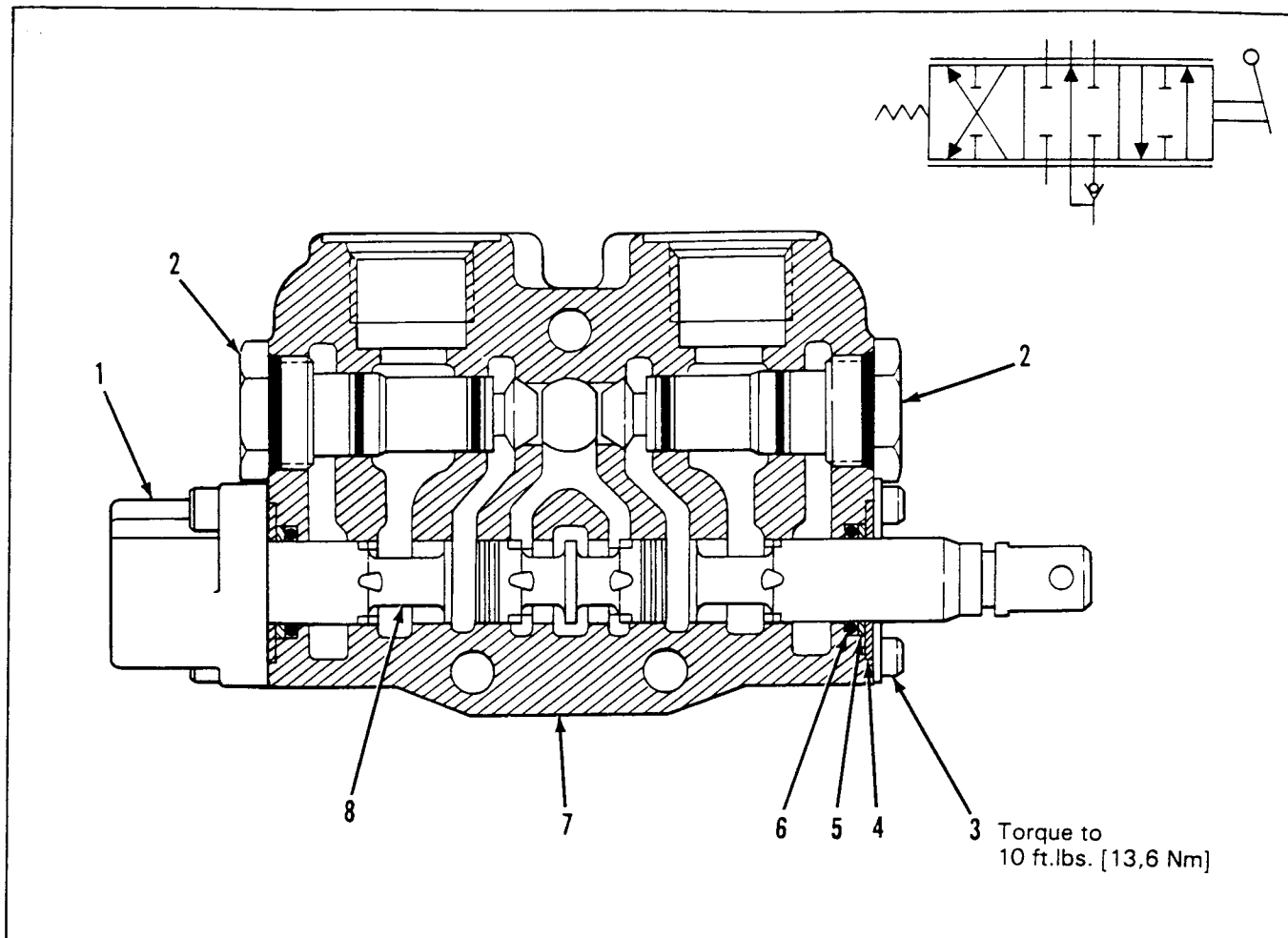


Figure 4-9. 4-Way, 3-Position, Tandem, Low Pressure Drop Valve Section.

4-WAY, 3-POSITION, TANDEM, LOW PRESSURE DROP VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6207-A	POSITIONER, Spool, Standard (See Figure 4-21)	1
2	K-6030-C	CHECK, Load (See Figure 4-32)	2
3	K-6033-B	RETAINER ASSEMBLY, Standard, Includes screws (See Figure 4-23. See Figure 4-24 thru 4-28 for optional assemblies.)	1
4	6752-001	RETAINER, Plate Washer	2
5	3265-001	WASHER, Back-Up	2
6	7700-001*	SEAL, O-Ring	2
7	10762-	HOUSING, Tandem, Low Pressure Drop	1
8	8084-001	SPOOL, 4-Way	1

Note: These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

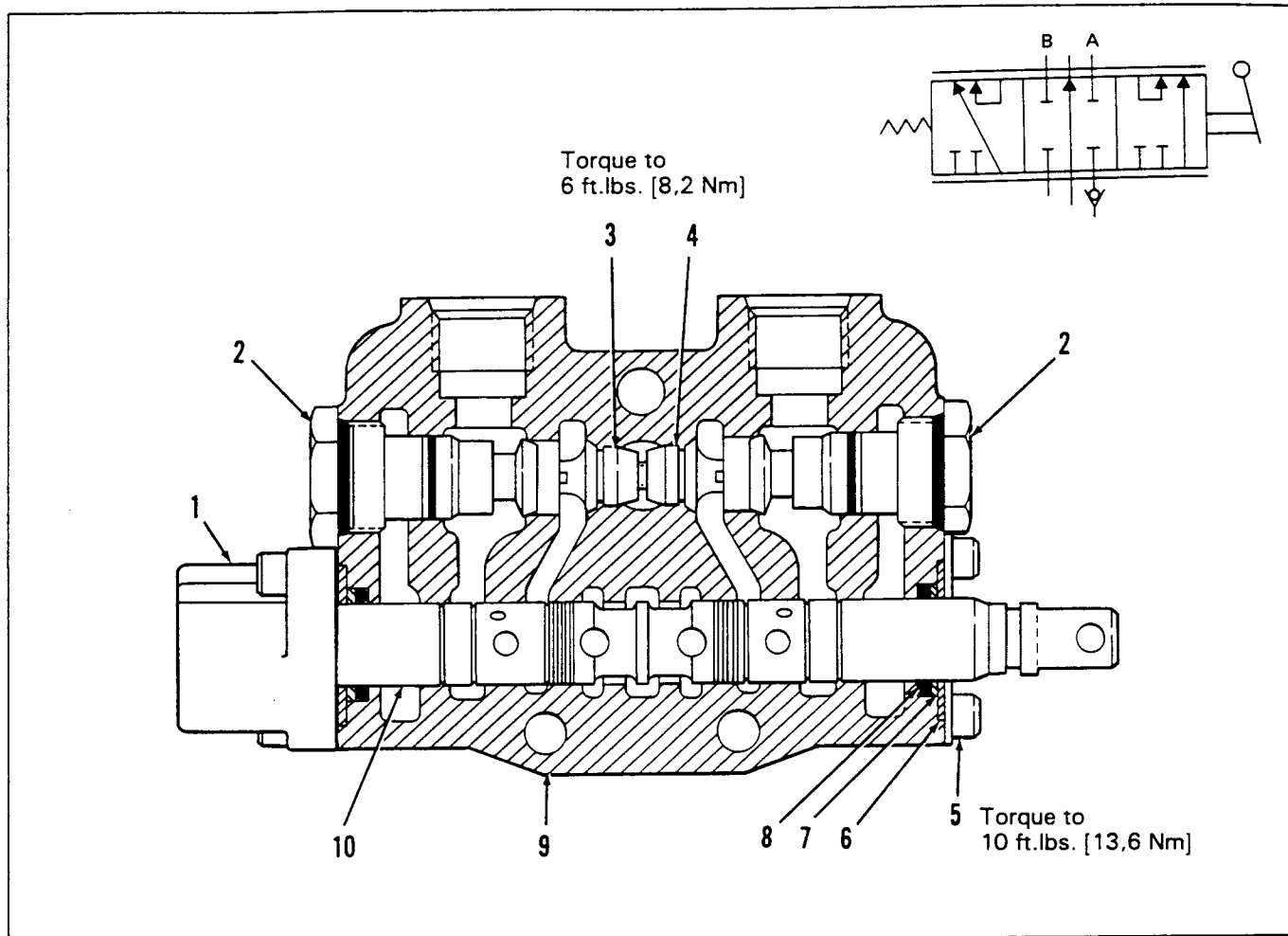


Figure 4-10. 4-Way, 3-Position, Series Valve Section.

4-WAY, 3-POSITION, SERIES VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6207-A	POSITIONER, Spool, Standard (See Figure 4-21)	1
2	K-6203	CHECK, Load (See Figure 4-33)	2
3	11246-001	PLUG, Power Core	1
4	11716-001	PLUG, Power Core	1
5	K-6033-B	RETAINER ASSEMBLY, Standard, Includes screws (See Figure 4-23. See Figure 4-24 thru 4-28 for optional assemblies.)	1
6	6752-001	RETAINER, Plate Washer	2
7	3265-001	WASHER, Back-Up	2
8	7700-001*	Seal, O-Ring	2
9	11483-	HOUSING, V20 Series	1
10	11245-001	SPOOL, Series, 4-Way	1

Notes:

1. Parts not sold separately. Order K-6200-A. Power core plug assembly is only used in Series housings manufactured prior to May 1, 1985 (Series housing #8072).

2. These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-6 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

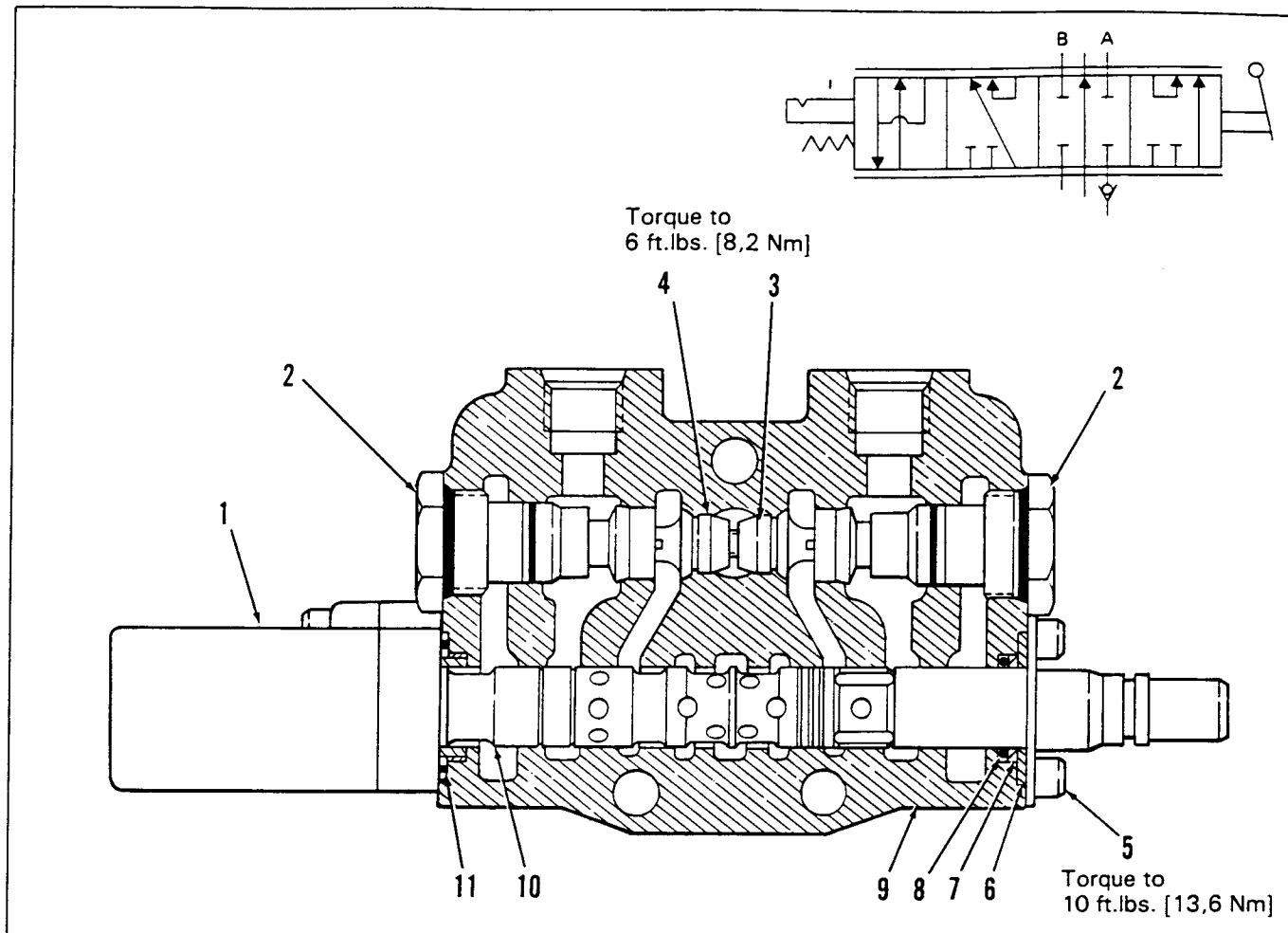


Figure 4-11. 4-Way, 4-Position Float, Series Valve Section.

4-WAY, 4-POSITION FLOAT, SERIES VALVE SECTION

Item No.	Part No.	Description	Quantity Per Section
1	K-6208	POSITIONER, Float Out (See Figure 4-22)	1
2	K-6203	CHECK, Load (See Figure 4-33)	2
3	11246-001	PLUG, Power Core	1
4	11716-001	PLUG, Power Core	1
5	K-6033-B	RETAINER ASSEMBLY, Standard, Includes screws (See Figure 4-23. See Figure 4-24 thru 4-28 for optional assemblies.)	1
6	6752-001	RETAINER, Plate Washer	1
7	3265-001	WASHER, Back-Up	1
8	7700-001*	SEAL, O-Ring	1
9	11483-	HOUSING, V20 Series	1
10	11377-001	SPOOL, Series, Float	1
11		SPOOL SEAL ASSEMBLY (See Figure 4-22)	1

Notes:

1. Parts not sold separately. Order K-6200-A. Power core plug assembly is only used in Series housings manufactured prior to May 1, 1985 (series housing #8072).
2. These are matched parts and are not sold separately. Refer to Ordering Instructions, page 3-2 for complete section.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

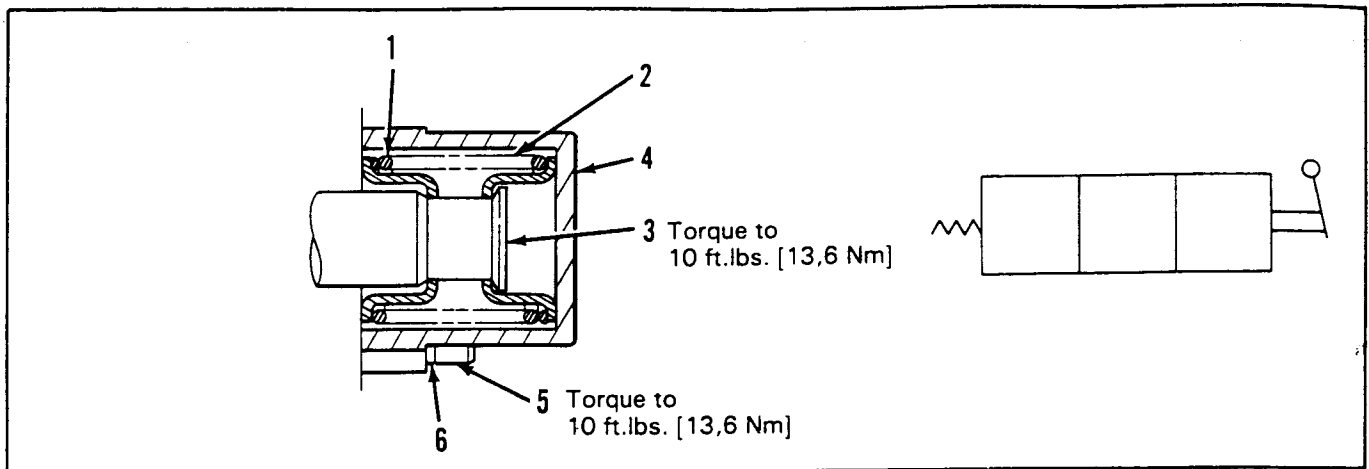


Figure 4-12. Standard Spool Positioner.

STANDARD SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
	K-6125-B	REPLACEMENT KIT (Contains all items listed below)	
1	7433-001	Spring, Return	1
2	1809-001	COLLAR, Spring	2
3	10892-001	COLLAR, Spool	1
4	1811-001	BONNET	1
5	3731-101	SCREW, HSHC, 1/4-20 x 7/8 inch long	2
6	0563-001	WASHER, Lock	2

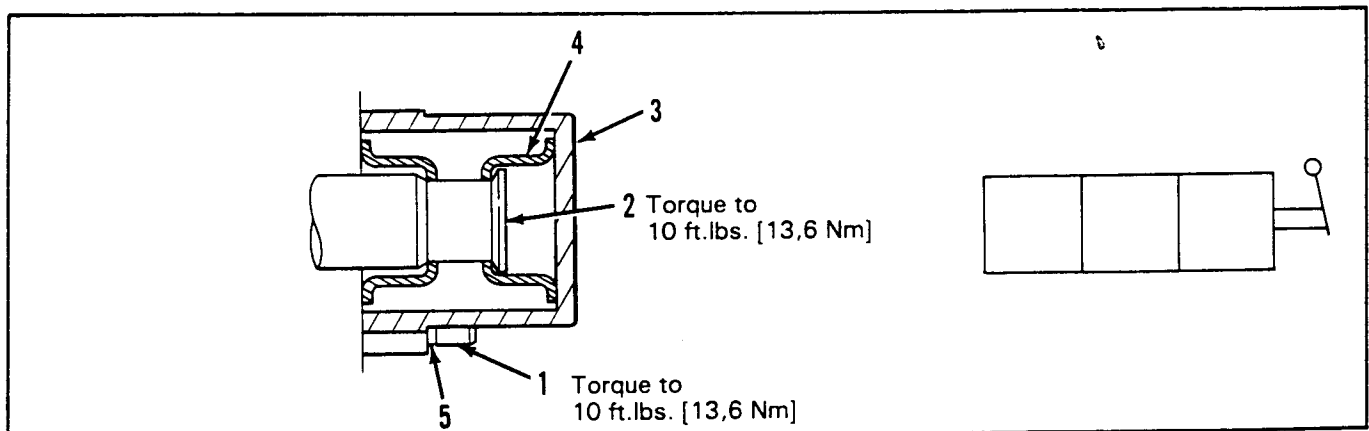


Figure 4-13. Manual Spool Positioner.

MANUAL SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
1	3731-101	SCREW, HSHC, 1/4-20 x 7/8 inch long	2
2	10892-001	COLLAR, Spool	1
3	1811-001	BONNET	1
4	1809-001	COLLAR, Stop	2
5	0563-001	WASHER, Lock	2

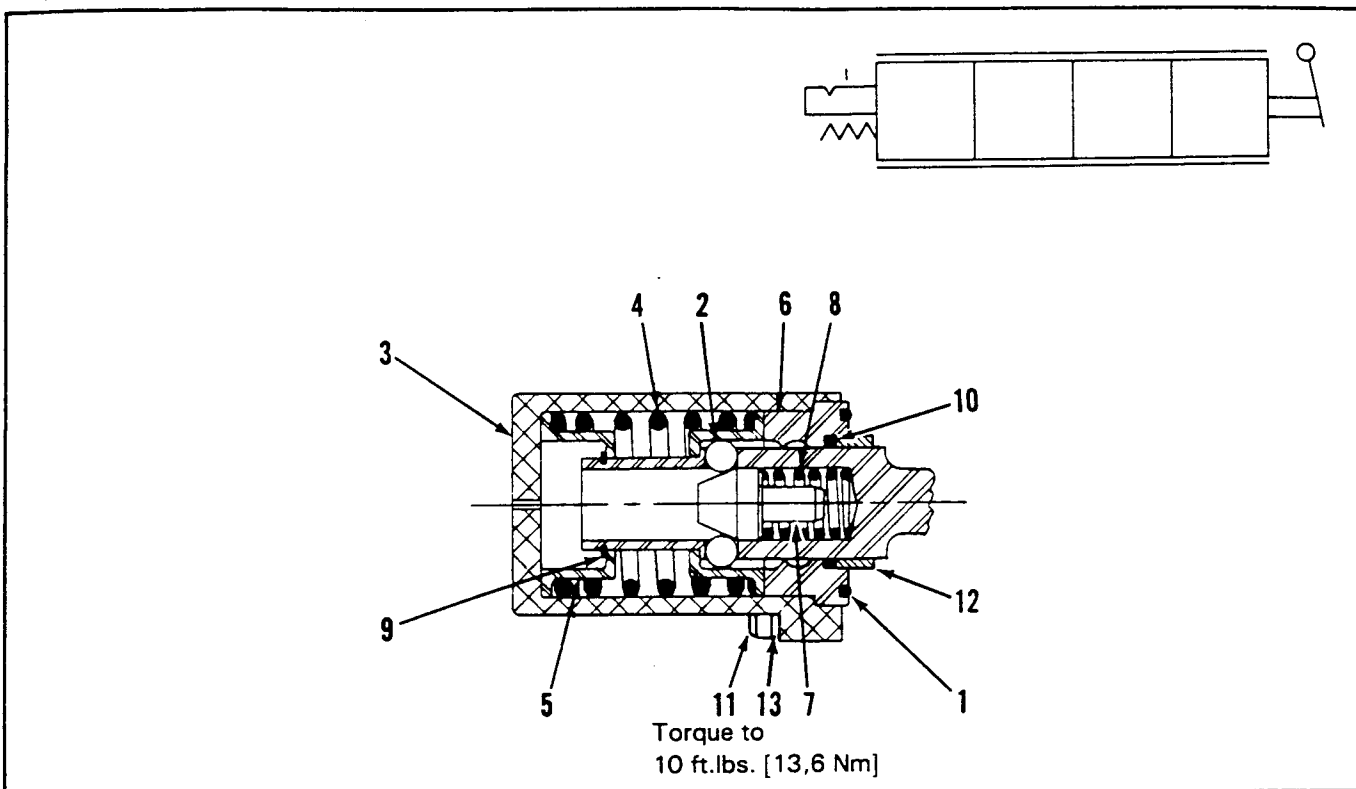


Figure 4-14. 4-Way, 4-Position Float Detent Positioner.

4-WAY, 4-POSITION FLOAT DETENT POSITIONER

Item No.	Part No.	Description	Quantity
	K-6127-B	REPLACEMENT KIT (Contains all items listed below)	
1	21047-001*	O-RING, Seal	1
2	1700-001	BALL, Detent	4
3	8082-001	BONNET, Float	1
4	8099-001	SPRING, Centering (See Note)	1
5	1826-001	COLLAR, Stop	2
6	8077-001	SLEEVE, Detent	1
7	1828-001	FOLLOWER, Detent Ball	1
8	8098-001	SPRING, Detent (See Note)	1
9	1852-001	RING, Retaining	1
10	1853-001*	SEAL, Spool	1
11	3731-101	SCREW, HSHC, 1/4-20 x 7/8 inch long	2
12	8079-001	SLEEVE, Retainer	1
13	0563-001	WASHER, Lock	2

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

Note:

Springs shown are standard. Heavy duty springs are available:

Order No. 3091-001 Heavy Duty Centering Spring.

Order No. 1829-001 Heavy Duty Detent Spring.

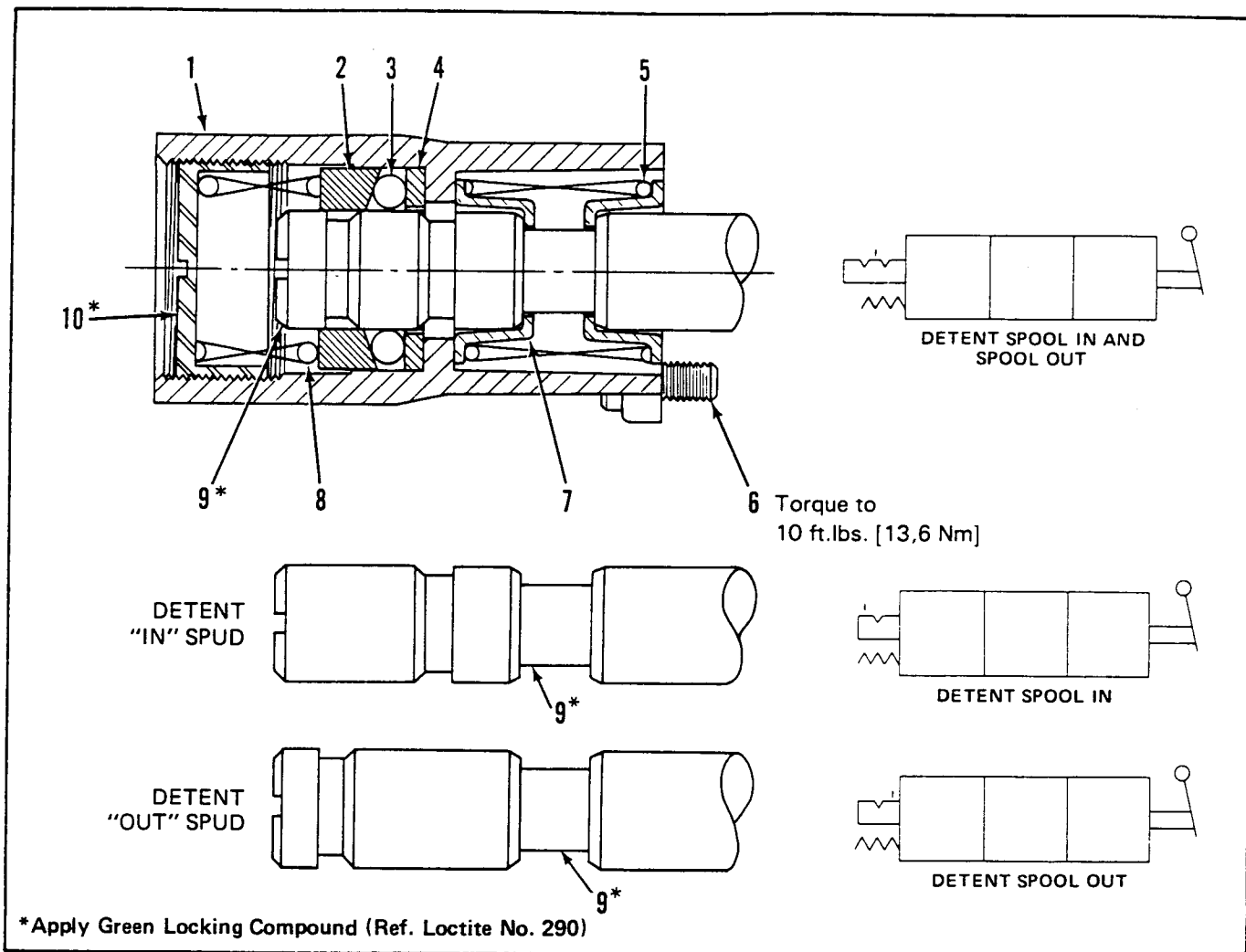


Figure 4-15. Option "R" Detent with Spring Return to Neutral.

OPTION "R" DETENT with SPRING RETURN TO NEUTRAL

Item No.	Part No.	Description	Quantity
	K-6152-A	REPLACEMENT KIT, Detent Spool "IN" position only	
	K-6151-A	REPLACEMENT KIT, Detent Spool "OUT" position only	
	K-6153-A	REPLACEMENT KIT, Detent Spool "IN" and "OUT" positions (Replacement Kits contain all of the items listed below with the correct spud (item 9) for each kit)	
1	8325-001	BONNET, R Detent	1
2	8571-001	RACE, Ball	1
3	1700-001	BALL, Steel	12
4	7994-001	PLATE, Thrust	1
5	3250-001	SPRING, Centering	1
6	3731-099	SCREW, HSHC, 1/4-20 by 5/8 inch long	2
7	1809-001	COLLAR, Spring	2
8	3252-001	SPRING	1
9	8573-001	SPUD, R Detent "IN"	1
	8572-001	SPUD, R Detent "OUT"	1
	8574-001	SPUD, R Detent "IN" and "OUT"	1
10	20443-001	CAP, Adjusting	1

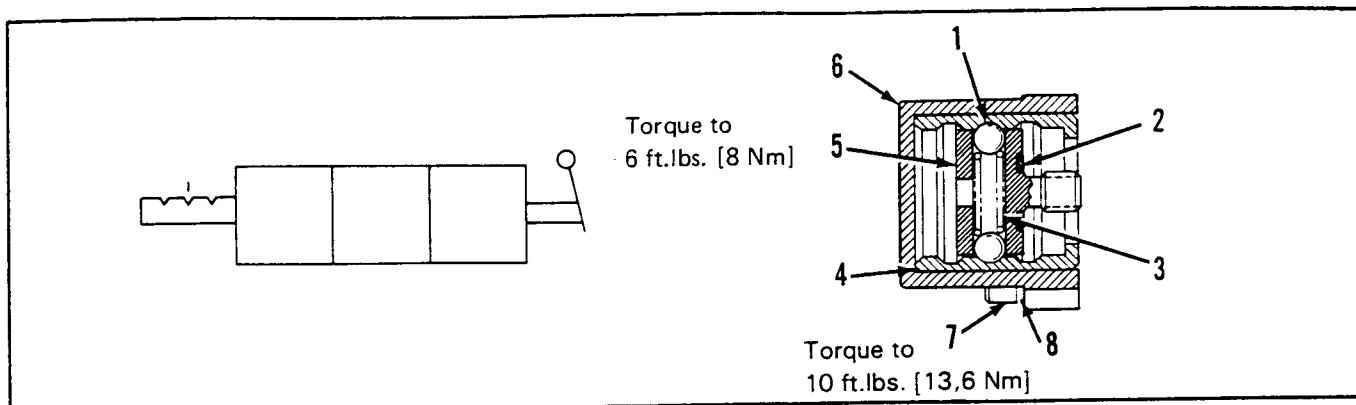


Figure 4-16. Option "D" 3-Position Detent Spool.

OPTION "D" 3-POSITION DETENT SPOOL

Item No.	Part No.	Description	Quantity
	K-6012-E	REPLACEMENT KIT (Contains all items listed below except item 8)	
1	0023-001	BALL, Detent	2
2	1837-001	WASHER, Lock	1
3	1838-001	SPRING, Detent	1
4	6812-001	SLEEVE, Detent, 3-position	1
5	1840-001	HOLDER, Detent	1
6	1811-001	BONNET	1
7	3731-101	SCREW, HSHC, 1/4-20 x 7/8 inch long	2
8	0563-001	WASHER, Lock	2
9	1889-001	STOP, Detent, optional (not shown)	1

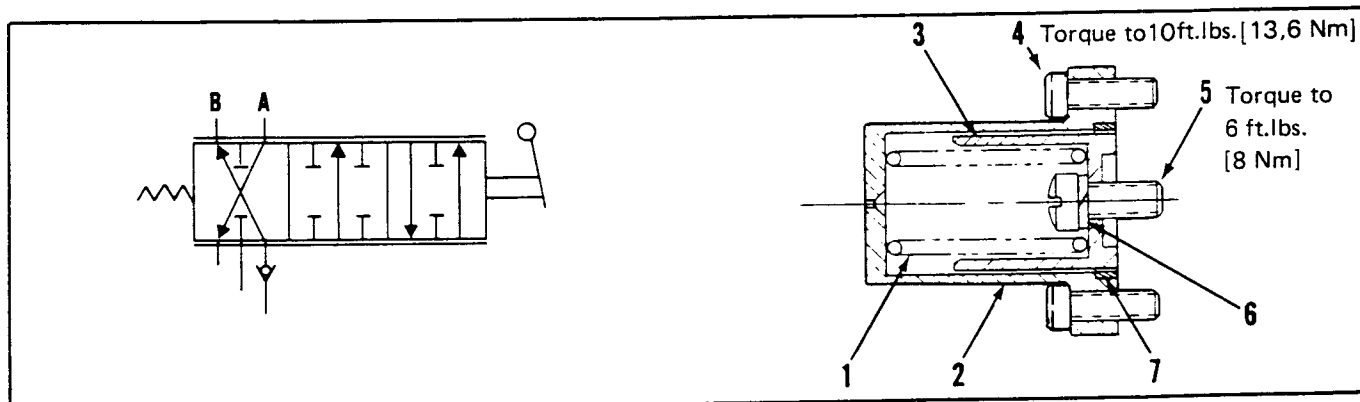


Figure 4-17. Option "A" Spring, Extended Spool.

OPTION "A" SPRING, EXTENDED SPOOL

Item No.	Part No.	Description	Quantity
	K-6150-A	REPLACEMENT KIT (Contains all items listed below)	
1	8666-001	SPRING, Return	1
2	1824-001	BONNET	1
3	1860-001	COLLAR, Stop	1
4	9161-407	SCREW, HSHC, 1/4-20 by 7/8 inch long	2
5	1812-001	SCREW, Cap	1
6	1813-001	WASHER, Lock	1
7	6756-001	SLEEVE, Bonnet	1

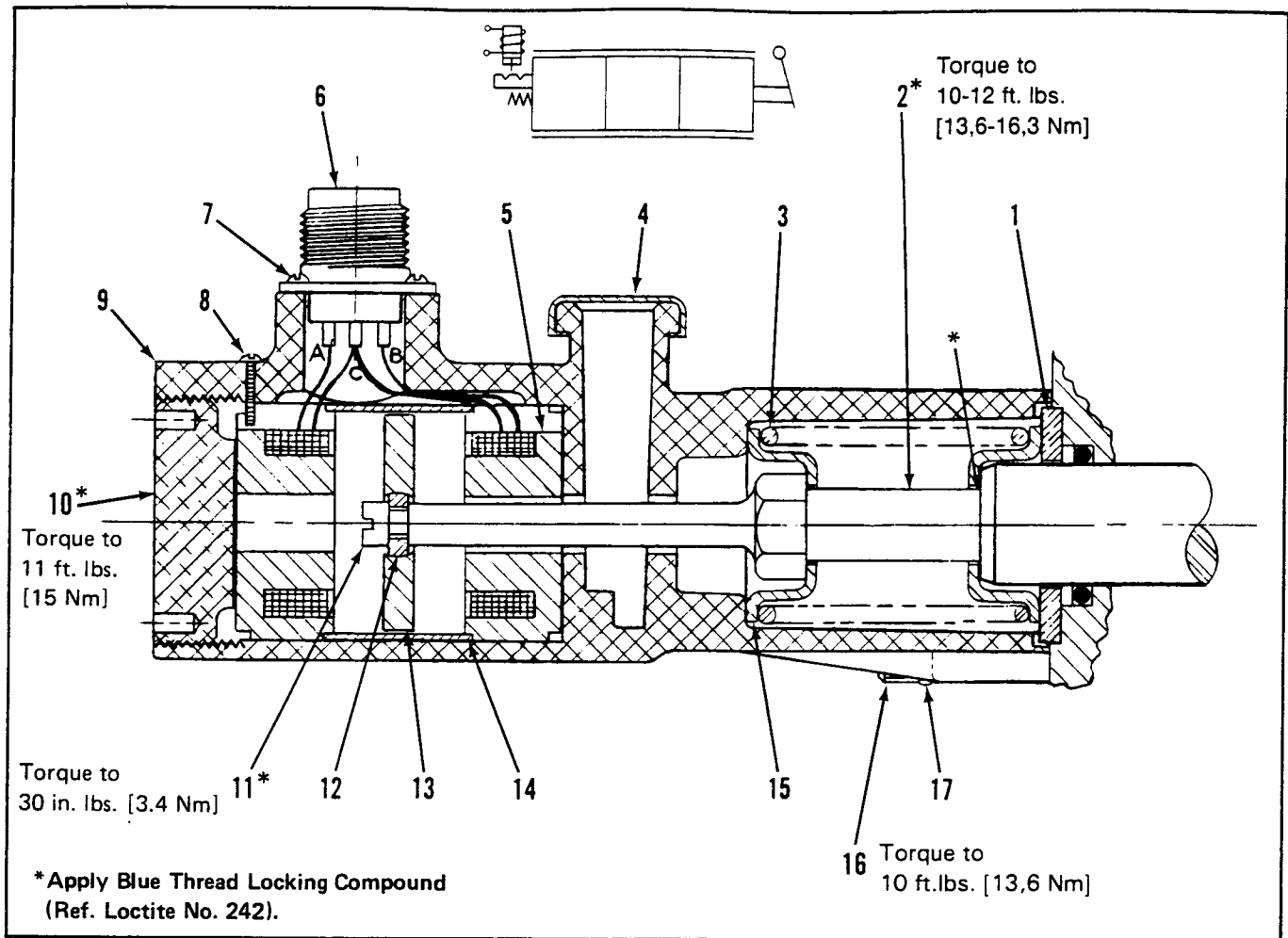


Figure 4-18. Electro-Magnetic Spool Release Positioner.

ELECTRO-MAGNETIC SPOOL RELEASE POSITIONER

Item No.	Part No.	Description	Quantity
	K-6064-A	REPLACEMENT KIT (Contains Items 2, 5, 11, 12, 13)	
1	7572-001	RETAINER, Spool Seal	1
2	7954-001	SPUD, Positioner	1
3	3250-001	SPRING, 1.114 OD x 0.095 WD	1
4	7589-001	CAP, Seal	1
5	7752-001	ELECTRO-MAGNET	2
6	7955-001	CONNECTOR, Electrical	1
7	7593-001	SCREW, Thread-Cutting	4
8	7956-001	SCREW, Thread-Cutting	1
9	7583-004	BONNET, Electric Detent	1
10	7957-001	PLUG, Bonnet	1
11	7756-001	SCREW, Shoulder, .188 x 0.156 inch long	1
12	7755-001	WASHER, Alignment	1
13	8555-001	ARMATURE	1
14	7958-001	SPACER	1
15	7573-001	COLLAR, Spring	2
16	3731-103	SCREW, Housing, .250 x 1.25 inches long	2
17	0563-001	WASHER, Lock, 0.250 ID	2

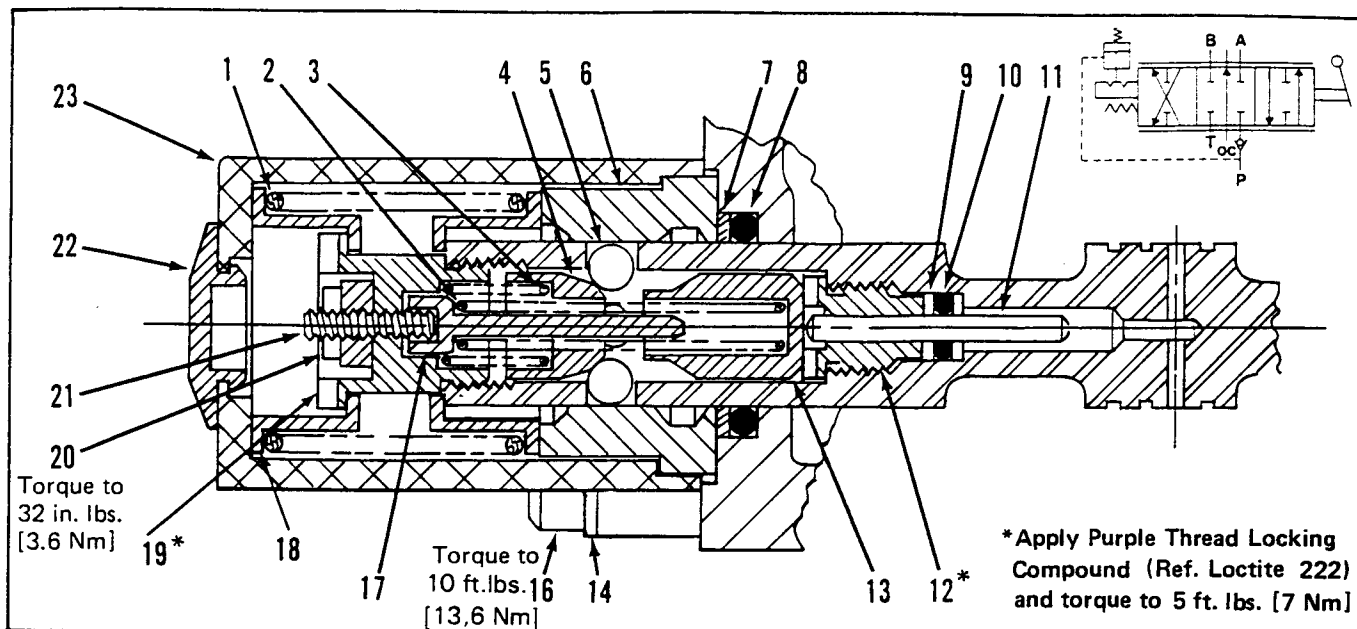


Figure 4-19. Optional Pressure Detent Release (KO) Positioner.

OPTIONAL PRESSURE DETENT RELEASE (KO) POSITIONER

Item No.	Part No.	Description	Quantity	
	K-6061-B	SEAL KIT (Contains items 7, 8, 9 and 10 listed below)		
1	7433-001	SPRING, Centering	1	
2	8047-001	SPRING, Standard (500-1600 PSI [35-110 bar] Crack)	1	
	8010-001	SPRING, Optional (1601-2400 PSI [111-165 bar] Crack)	1	
	8538-001	SPRING, Optional (2401-3000 PSI [166-207 bar] Crack)	1	
	8537-001	SPRING, Optional (3001-3500 PSI [166-207 bar] Crack)	1	
3	7898-001	SPRING, 0.385 O.D.x.054 W.D.	1	
4	7897-001	FOLLOWER, Ball	1	
5	1700-001	BALL, Steel	4	
6	8007-001	SLEEVE, Detent	1	
7	3265-001	RING, Back-Up	Not Sold Separately Order K-6061-B	1
8	7700-001*	SEAL, O-Ring		1
9	7907-001	RING, Back-Up		2
10	3328-001	SEAL, O-Ring		1
11	7908-001	ROLLER, Needle		1
12	7906-001	GUIDE, Piston		1
13	7896-001	PLUNGER, Knockout		1
14	7904-001	PLATE, Bearing		2
16	9161-407	SCREW, HSHC, 1/4-20 by 7/8 inch long		2
17	7899-001	GUIDE, Spring		1
18	8536-001	COLLAR, Spring		2
19	8535-001	COLLAR, Spool		1
20	6229-001	LOCKNUT		1
21	8014-001	SCREW, Hex Set, No. 10-24x0.62		1
22	7902-001	PLUG, Button, Flush Head		1
23	1824-002	BONNET		1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

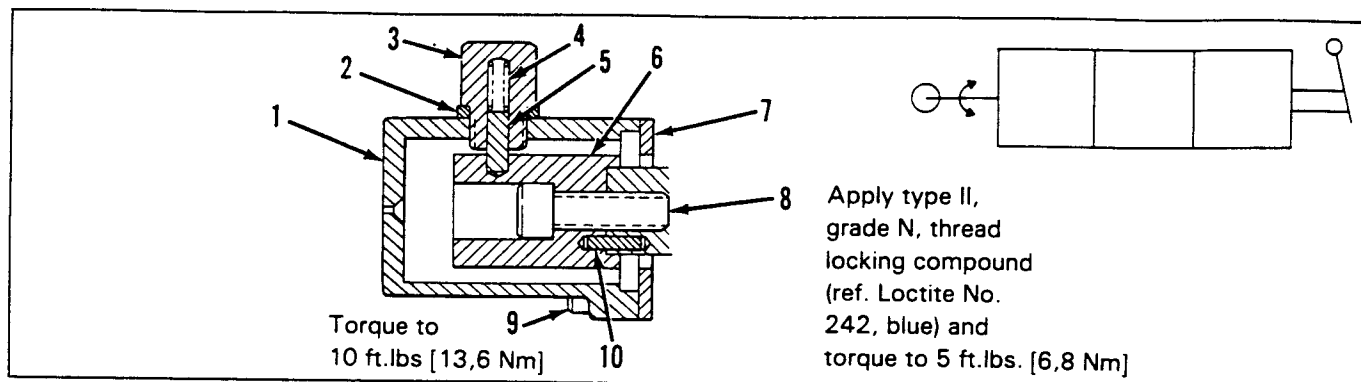


Figure 4-20. Option "W" Rotary Spool Positioner.

OPTION "W" ROTARY SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
	K-6141-C	REPLACEMENT KIT (Contains all items listed below)	
1	1824-006	BONNET, Rotary	1
2	8743-001	WASHER, Detent Cap	1
3	8744-001	CAP, Rotary Detent	1
4	8808-001	SPRING, Detent	1
5	2676-001	PIN, Detent	1
6	8746-001	BODY, Rotary Cam	1
7	6552-001	PLATE, Seal Retainer	1
8	3731-150	SCREW, HSHC, 5/16-18 by 1 inch long	1
9	9161-407	SCREW, HSHC, 1/4-20 by 7/8 inch long	2
10	0888-001	PIN, Dowel	1

NOTE: Apply heavy duty, general purpose grease to the helical groove of Cam Body (Item 6) and Pin (Item 5). For standard assembly, hole in spool clevis must be horizontal with valve spool in neutral.

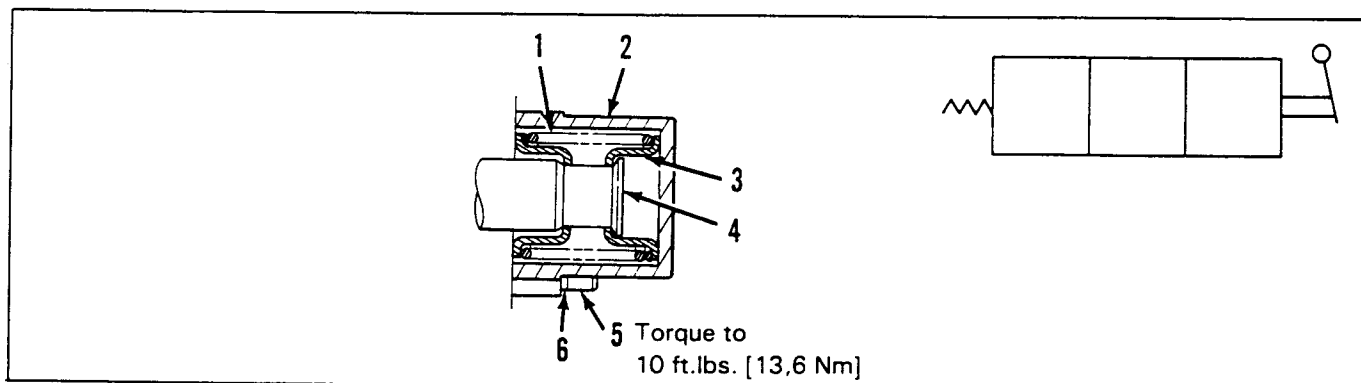


Figure 4-21. Series or Low Pressure Drop, Standard Spool Positioner.

SERIES OR LOW PRESSURE DROP, STANDARD SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
	K-6207-A	REPLACEMENT KIT (Contains all items listed below)	
1	10956-001	SPRING, Return	1
2	1811-001	BONNET	1
3	1809-001	COLLAR, Spring	2
4	10892-001	COLLAR, Spool	1
5	3731-101	SCREW, HSHC, 1/4-20 x 7/8 inch long	2
6	0563-001	WASHER, Lock	2

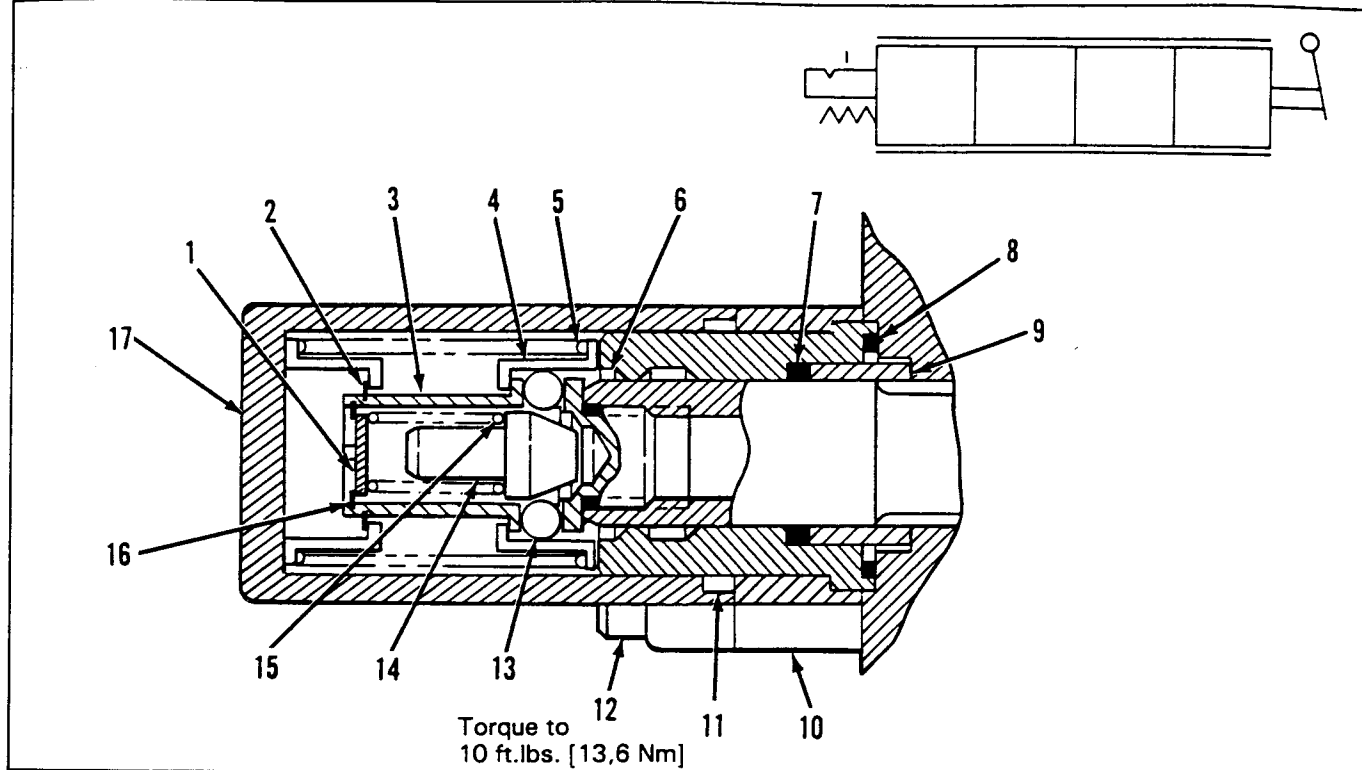


Figure 4-22. V20S 4-Way, 4-Position Float (out) Detent Positioner.

V20S 4-WAY, 4-POSITION FLOAT (OUT) DETENT POSITIONER

Item No.	Part No.	Description	Quantity
	K-6208	REPLACEMENT KIT (Contains all items listed below)	
1	11371-001	SHIM	1
2	1852-001	RING, Retaining	1
3	11373-001	COLLAR, Spool	1
4	1826-001	COLLAR, Spring	2
5	1807-001	SPRING, Centering	1
6	0449-001*	SEAL, O-Ring	1
7	1853-001*	SEAL, Four Lobed	1
8	21047-001*	SEAL, O-Ring	1
9	8079-001	SLEEVE, Retainer	1
10	7905-001	SPACER, Bonnet	1
11	11372-001	SLEEVE, Detent	1
12	9161-412	SCREW, HSHC, 1/4-20 by 1½ inch long	2
13	1700-001	BALL, Detent	4
14	1828-001	FOLLOWER, Ball	1
15	1829-001	SPRING, Detent	1
16	9320-016	RING, Retaining	1
17	8082-001	BONNET	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

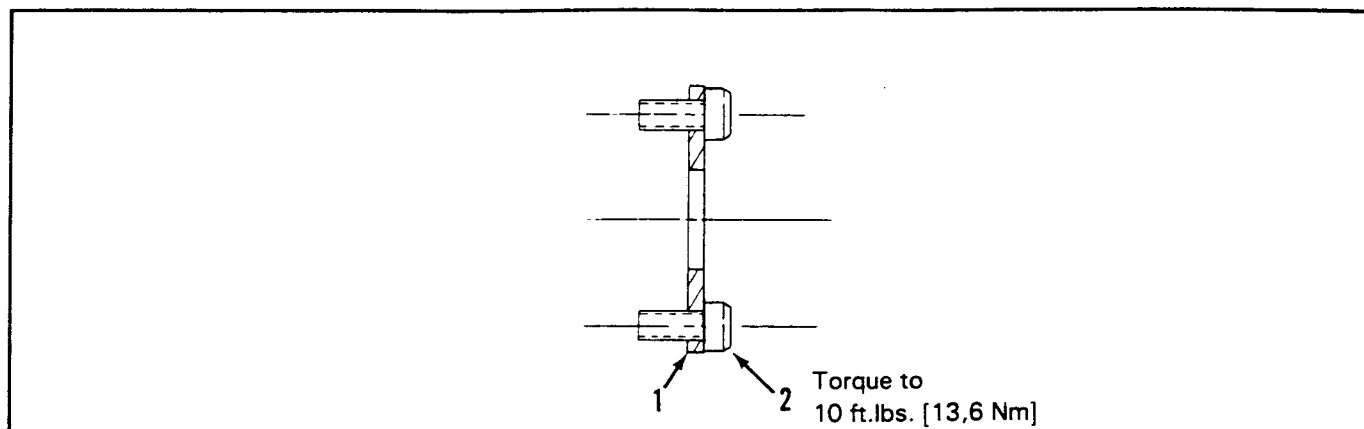


Figure 4-23. Standard Seal Retainer.

STANDARD SEAL RETAINER

Used when handle bracket is not furnished and tank line pressures are below 200 PSI [14 bar].

Item No.	Part No.	Description	Quantity
	K-6033-B	REPLACEMENT KIT (Contains items 1 and 2)	
1	6552-001	PLATE	1
2	3731-098	SCREW, HSHC, 1/4-20 by 1/2 inch long	2

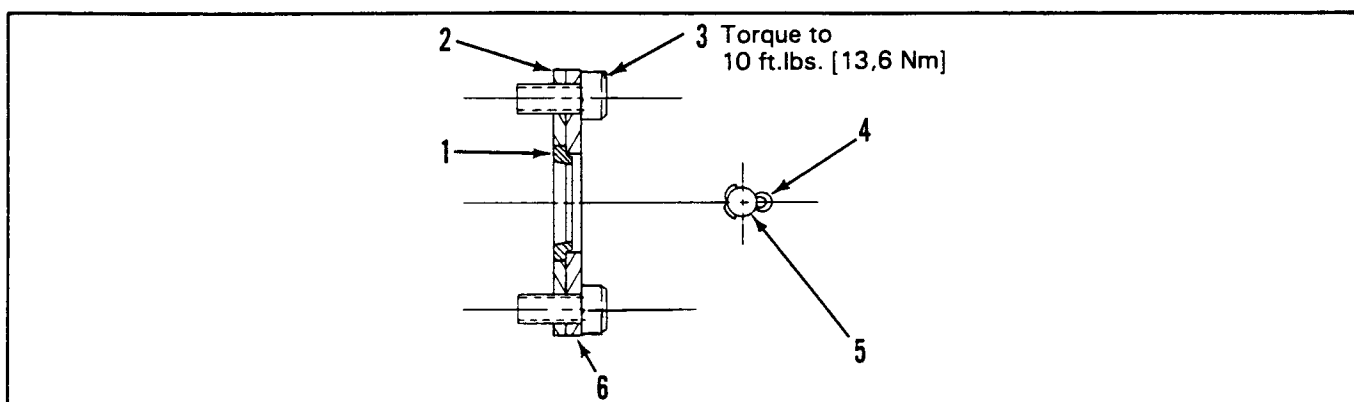


Figure 4-24. Optional Heavy Duty Seal Retainer.

OPTIONAL HEAVY DUTY SEAL RETAINER WITH OPTIONAL SPOOL WIPER

Used when handle bracket is not furnished and tank line pressure is below 1000 PSI, [69 bar], and when wiper seal is desired.

Item No.	Part No.	Description	Quantity
	K-6029-B	REPLACEMENT KIT (Contains all items listed below)	
1	1800-001	WIPER, Spool (Optional) <i>AN0750 Rodwiper - AN5 Transaids</i>	1
2	6802-001	PLATE, Seal	1
3	3731-098	SCREW, HSHC, 1/4-20 by 1/2 inch long	2
4	0086-001	PIN, Cotter	1
5	1857-001	PIN	1
6	6552-001	PLATE	1

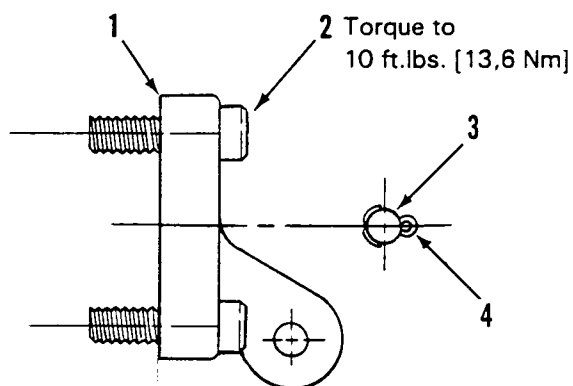


Figure 4-25. Handle Bracket Assembly.

HANDLE BRACKET ASSEMBLY

Item No.	Part No.	Description	Quantity
	K-6031-A	REPLACEMENT KIT, Standard, (Contains items 1, 2, 3 and 4)	
	K-6037-A	SERVICE KIT, Heavy Duty, (Contains items 1 and 2)	
1	1801-001	BRACKET, Die Cast (Standard)	1
	1801-002	BRACKET, Die Cast (Optional, for use with CRA Relief)	1
	7355-001	BRACKET, Cast Iron (Optional, Heavy Duty)	1
2	9161-407	SCREW, HSHC, 1/4-20 by 7/8 inch long	2
3	1857-001	PIN	1
4	0086-001	PIN, Cotter	1
5	1800-001	SEAL, Wiper, optional (not shown)	1

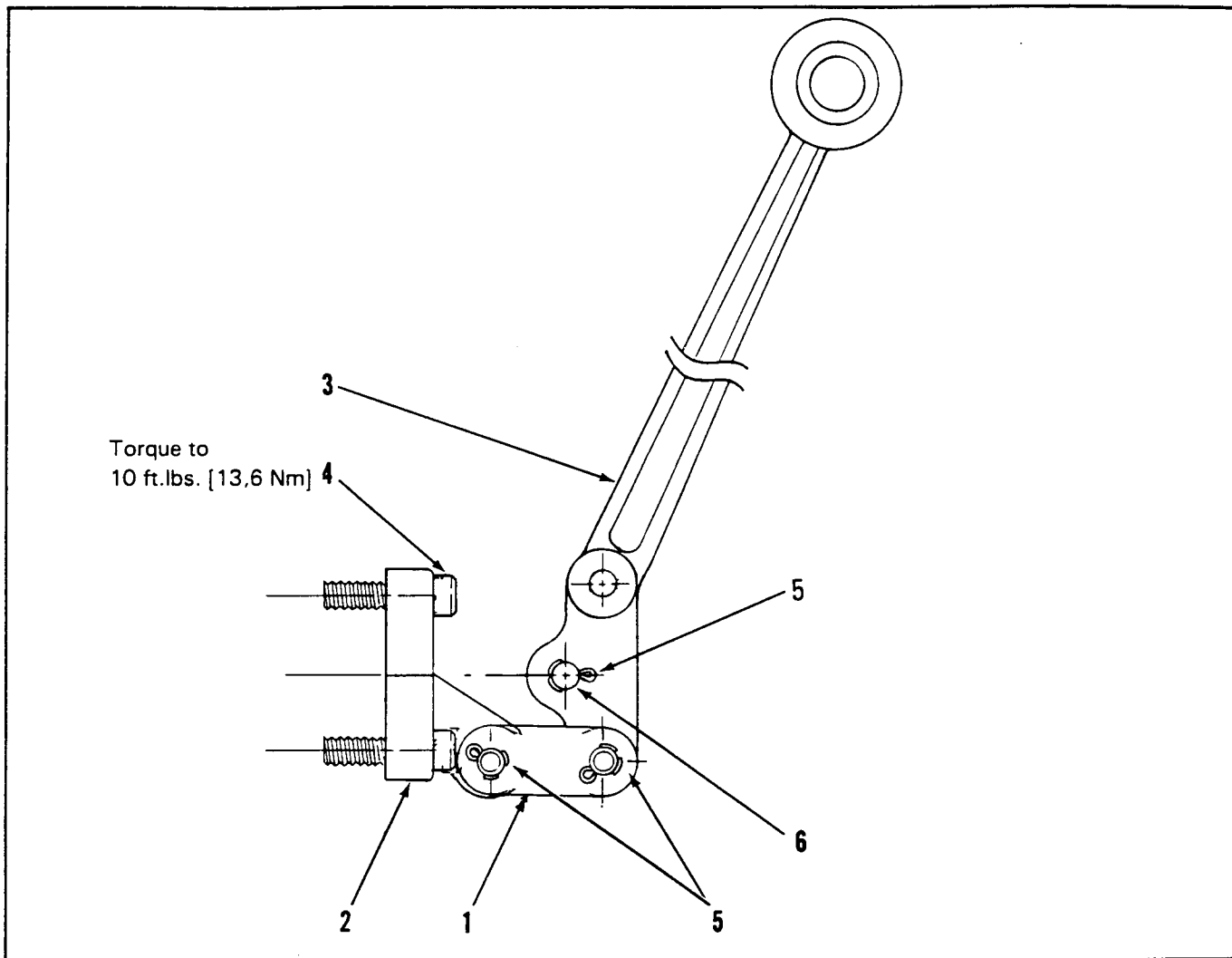


Figure 4-26. Optional Vertical Handle and Bracket Assembly.

OPTIONAL VERTICAL HANDLE and BRACKET ASSEMBLY

Item No.	Part No.	Description	Quantity
	K-6004-B	REPLACEMENT KIT, Standard (Black plastic coated handle)	
	K-6137-A	REPLACEMENT KIT, Optional (Plain handle)	
	All Replacement Kits contain all items listed below except No. 7355-001, Bracket		
1	11393-001	LINK	1
	11392-001	PLATE, Link	1
2	1801-001	BRACKET, Die Cast (Standard)	1
	7355-001	BRACKET, Cast Iron (Optional, Heavy Duty)	1
3	1802-001	HANDLE, Standard Vertical, Black plastic coated	1
	1802-003	HANDLE, Optional Vertical, Plain	1
4	9161-407	SCREW, HSHC, 1/4-20 by 7/8 inch long	2
5	0086-001	PIN, Cotter	3
6	1857-001	PIN	1
7	1800-001	SEAL, Wiper, optional (not shown)	1

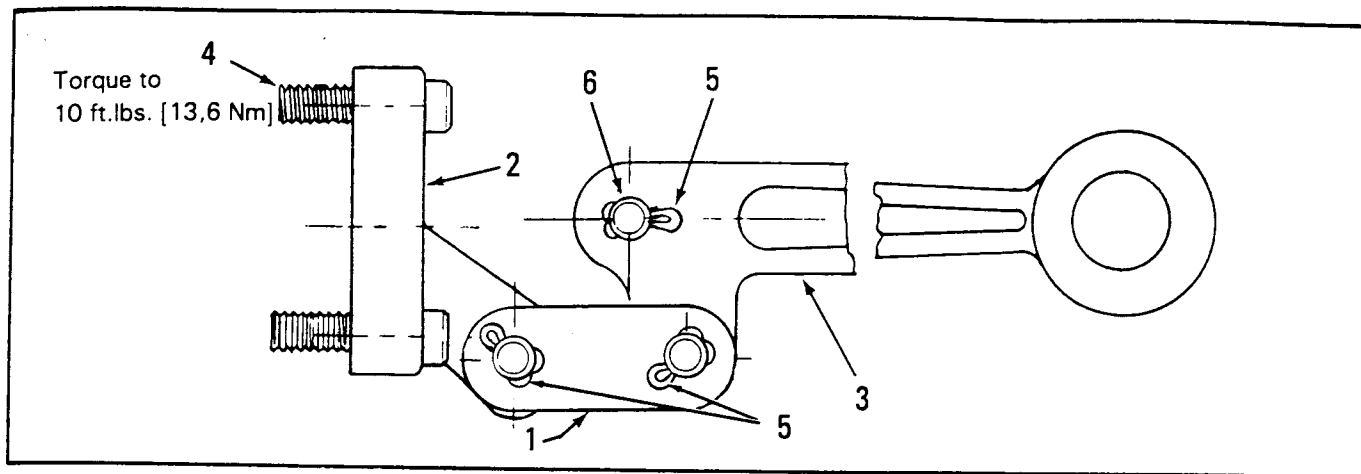


Figure 4-27. Optional Horizontal Handle and Bracket Assembly.

OPTIONAL HORIZONTAL HANDLE and BRACKET ASSEMBLY

Item No.	Part No.	Description	Quantity
	K-6007-B	REPLACEMENT KIT, Standard (Black plastic coated handle)	
	K-6139-A	REPLACEMENT KIT, Optional (Plain handle)	
	All Replacement Kits contain all items listed below except No. 7355-001, Bracket		
1	11393-001	LINK	1
	11392-001	PLATE, Link	1
2	1801-001	BRACKET, Die Cast (Standard)	1
	7355-001	BRACKET, Cast Iron (Optional Heavy Duty)	1
3	3249-001	HANDLE, Standard Horizontal, Black plastic coated	1
	3249-003	HANDLE, Optional Horizontal, Plain	1
4	9161-407	SCREW, HSHC, 1/4-20 by 7/8 inch long	2
5	086-001	PIN, Cotter	3
6	1857-001	PIN	1
7	1800-001	SEAL, Wiper, optional (not shown)	1

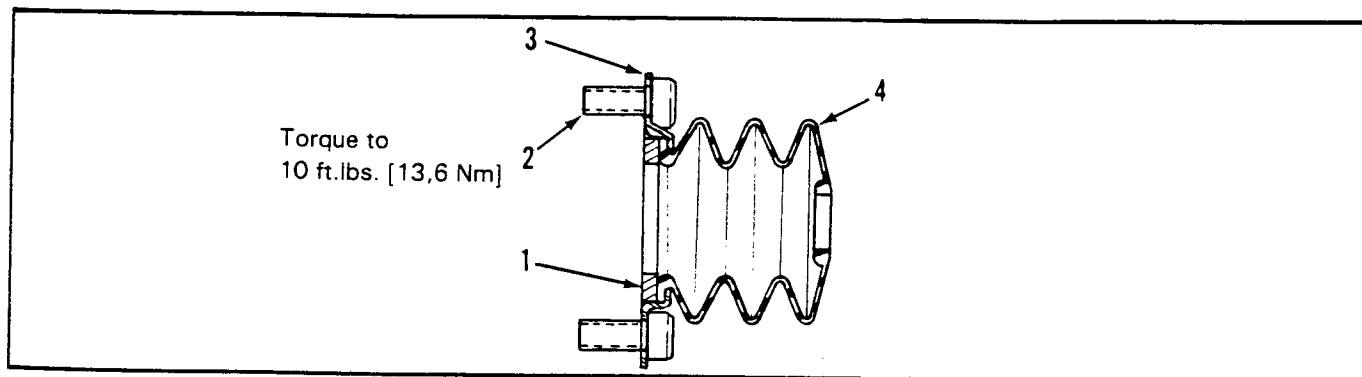


Figure 4-28. Spool Protective Boot Assembly.

SPOOL PROTECTIVE BOOT ASSEMBLY

Item No.	Part No.	Description	Quantity
	K-6056-B	REPLACEMENT KIT (Contains all items listed below)	
1	7624-001	WASHER, Breather	1
2	3731-098	SCREW, HSHC, 1/4-20 by 1/2 inch long	2
3	7623-001	RETAINER, Boot	1
4	7622-001	BOOT	1

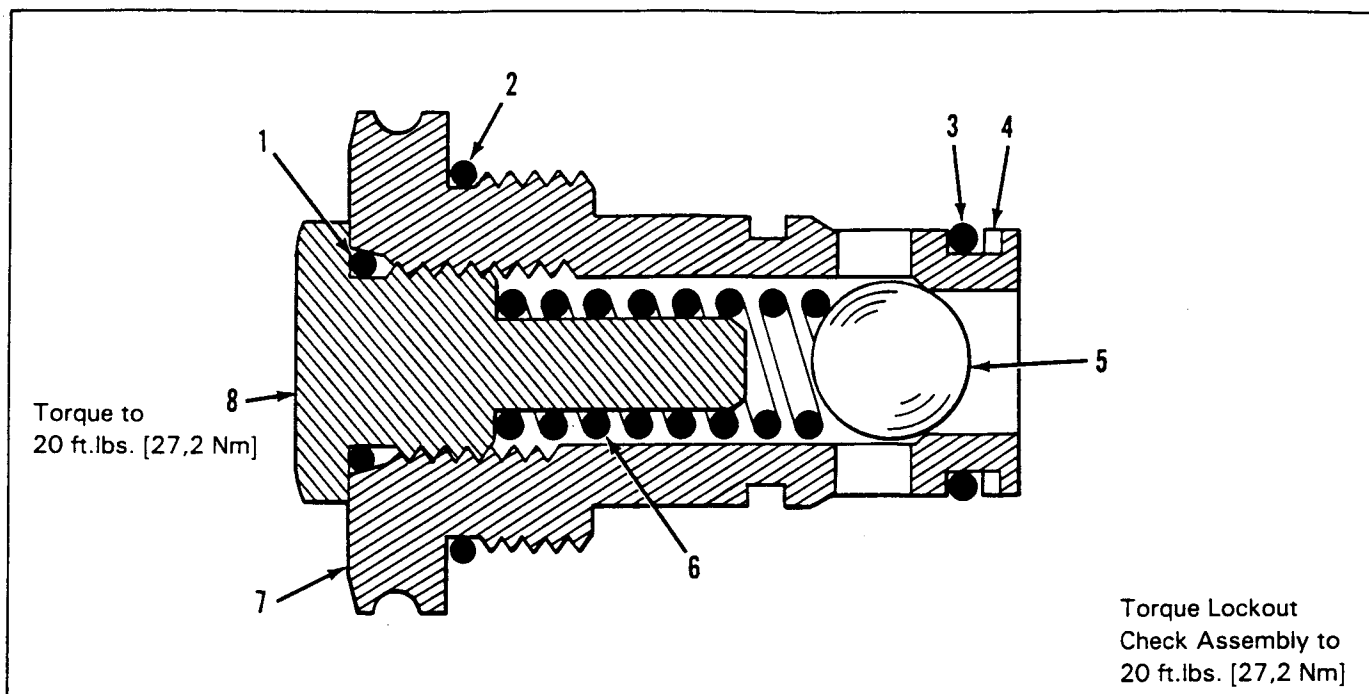


Figure 4-29. Lockout Check Assembly.

LOCKOUT CHECK ASSEMBLY

Item No.	Part No.	Description	Quantity Per Check
	K-6024-D*	REPLACEMENT KIT (Contains all items listed below)	
	K-6039*	SEAL KIT (Contains items 1 thru 4)	
1	0449-001*	SEAL, O-Ring	1
2	2707-001*	SEAL, O-Ring	1
3	1818-001*	SEAL, O-Ring	1
4	3092-001	RING, Back-Up, Cut	1
5	0071-001	BALL, Steel	1
6	1571-001	SPRING	1
7	11466-001	BODY, Check	1
8	0216-001	CAP, Check	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

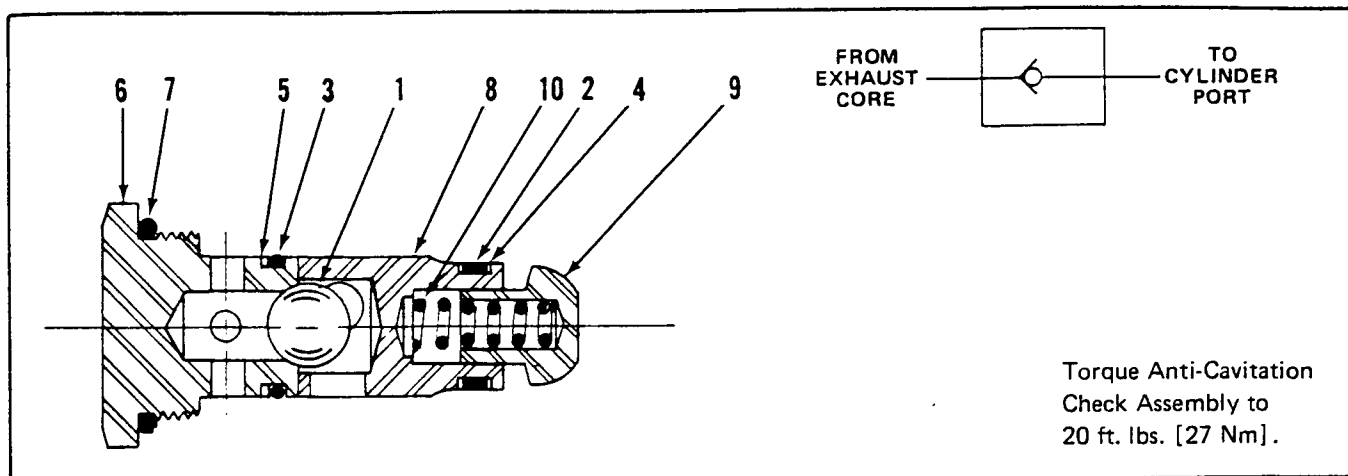


Figure 4-30. Optional Anti-Cavitation Check Assembly.

OPTIONAL ANTI-CAVITATION CHECK ASSEMBLY

Item No.	Part No.	Description	Quantity Per Check
	K-6021-A*	REPLACEMENT ANTI-CAVITATION ASSEMBLY (Contains all items listed below)	
	K-6032*	SEAL KIT (Contains items 2, 3, 4, 5 and 7 listed below)	
1	0071-001	BALL, Steel, 7/16 inch	1
2	1818-001*	SEAL, O-Ring	1
3	1819-001*	SEAL, O-Ring	1
4	1820-001	WASHER, Back-Up, inner, Check Plug	2
5	1821-001	WASHER, Back-Up, Outer, Check Plug	1
6	1822-001	BODY, Check, Anti-Cavitation	1
7	2707-001*	SEAL, O-Ring	1
8	1823-001	RETAINER, Ball, Check	1
9	2781-001	CHECK, Steel	1
10	1868-001	SPRING, Check	1

Not Sold
Separately
Order K-6032

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

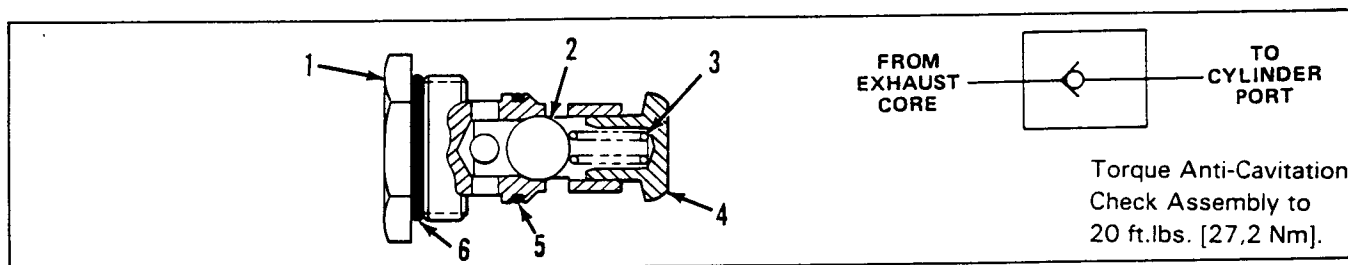


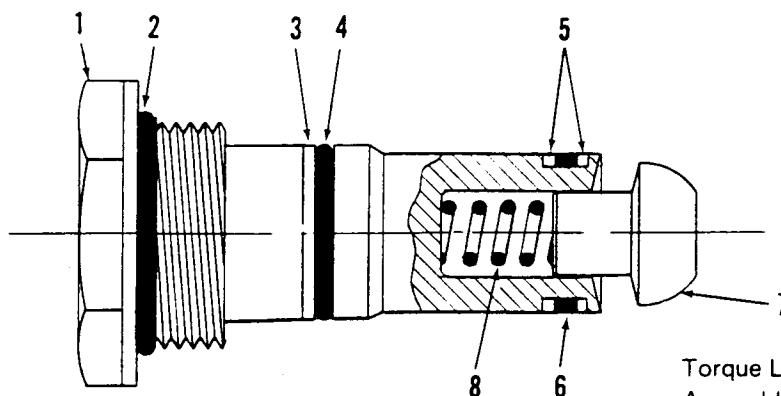
Figure 4-31. Optional, V20S Anti-Cavitation Check Assembly.

OPTIONAL, V20S ANTI-CAVITATION CHECK ASSEMBLY

Item No.	Part No.	Description	Quantity Per Check
	K-6205*	REPLACEMENT KIT (Contains all items listed below)	
	K-6206*	SEAL KIT (Contains items 5 and 6)	
1	11340-001	BODY, Check	1
2	0071-001	BALL, Steel, 7/16 inch	1
3	11343-001	SPRING, Check	1
4	7791-002	POPPET, Check	1
5	1819-001*	SEAL, O-Ring	1
6	2707-001*	SEAL, O-Ring	1

Not sold separately.
Order K-6206

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.



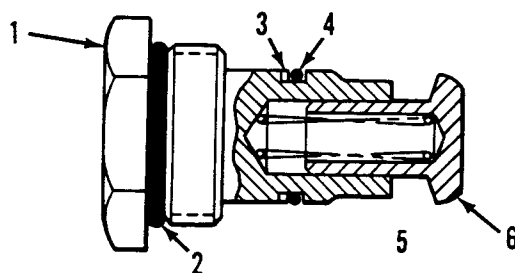
Torque Load Check Plug
Assembly to 20 ft.lbs. [27 Nm].

Figure 4-32. Load Check Plug Assembly.

LOAD CHECK PLUG ASSEMBLY

Item No.	Part No.	Description	Quantity Per Plug Assembly	
	K-6030-A*	REPLACEMENT LOAD CHECK PLUG ASSEMBLY.		
	K-6032*	SEAL KIT, (Contains items 2, 3, 4, 5 and 6)		
1	3411-001	Plug, Lift Check, Steel (Heavy Duty)	1	
2	2707-001*	SEAL, O-Ring	} Not Sold Separately Order K-6032	1
3	1821-001	WASHER, Back-Up, Outer		1
4	1819-001*	SEAL, O-Ring, Outer		1
5	1820-001	WASHER, Back-Up, Inner		2
6	1818-001*	SEAL, O-Ring		1
7	2781-001	POPPET, Lift Check		1
8	1868-001	SPRING, Lift Check		1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.



Torque Load Check Plug
Assembly to 20 ft.lbs. [27,2 Nm].

Figure 4-33. V20S Load Check Plug Assembly.

V20S LOAD CHECK PLUG ASSEMBLY

Item No.	Part No.	Description	Quantity Per Plug Assembly	
	K-6203*	REPLACEMENT KIT (Contains all items listed below)		
	K-6204*	SEAL KIT (Contains items 2, 3 and 4)		
1	11241-001	PLUG, Load Check	1	
2	2707-001*	SEAL, O-Ring	Not sold separately. Order K-6204	1
3	1821-001	RING, Back-Up		1
4	1819-001*	SEAL, O-Ring		1
5	1868-001	SPRING, Load Check		1
6	7791-001	POPPET, Load Check		1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

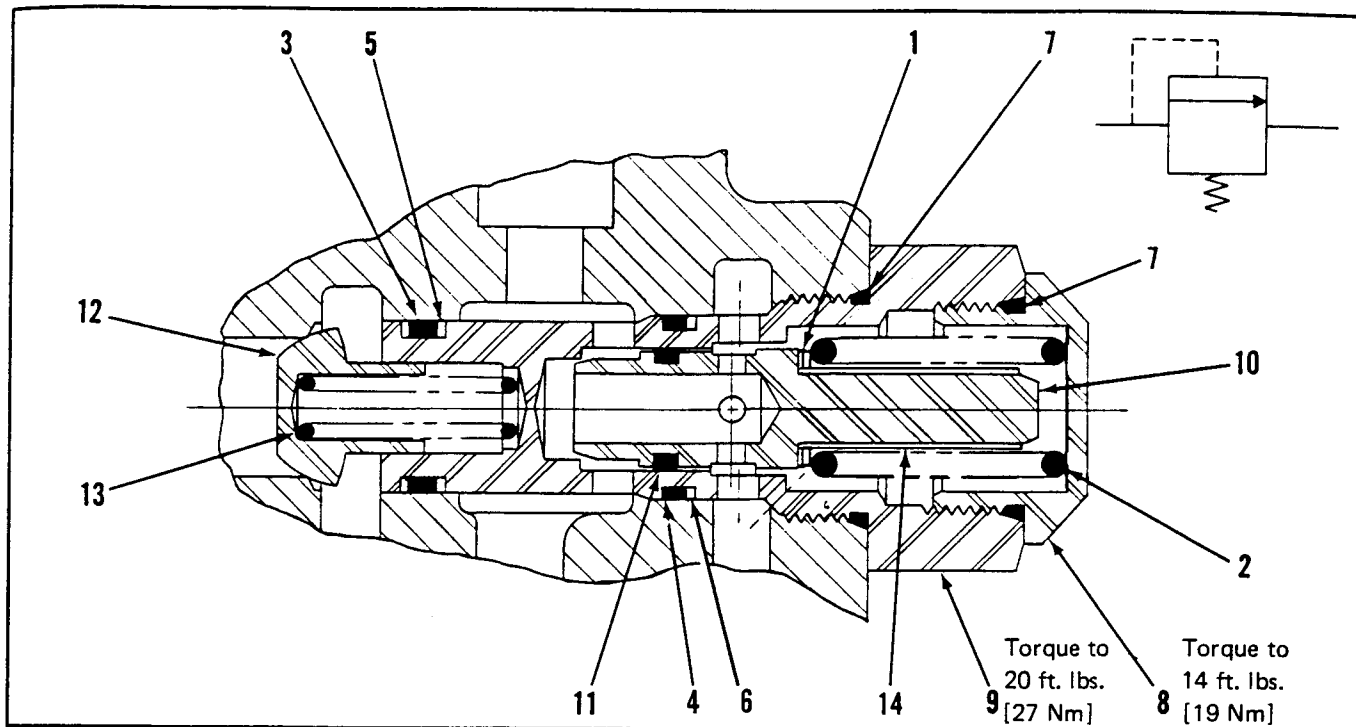


Figure 4-34. Optional Model RC Cylinder Port Relief (non-adjustable type).

OPTIONAL MODEL RC CYLINDER PORT RELIEF (Non-Adjustable Type)

For replacement Model RC Relief Cartridge, specify pressure setting required.

Item No.	Part No.	Description	Quantity Per Relief
	K-19002	SERVICE KIT (Contains items 10 and 11)	
	K-6005A*	SEAL KIT (Contains all seals - items 3, 4, 5, 6 and 7)	
1	0458-001	SHIM (.040 inch [1,0 mm] thick)	A/R
	0459-001	SHIM (.020 inch [0,5 mm] thick)	A/R
	0462-001	SHIM (.010 inch [0,25 mm] thick)	A/R
2	1450-001	SPRING (500-1350 PSI [35-93 bar] Crack)	1
	1869-001	SPRING (500-1249 PSI [34-86 bar] Crack)	1
	7638-001	SPRING (1250-1749 PSI [86-121 bar] Crack)	1
	7078-001	SPRING (1750-1999 PSI [121-138 bar] Crack)	1
	1870-001	SPRING (2000-2599 PSI [138-179 bar] Crack)	1
3	1818-001*	SEAL, O-Ring	1
4	1819-001*	SEAL, O-Ring	1
5	1820-001	WASHER, Back-Up, Inner, Check Plug	Not Sold Separately Order K-6005A
6	1821-001	WASHER, Back-Up, Outer, Check Plug	
7	2707-001*	SEAL, O-Ring	
8	1880-001	CAP, Relief	1
9	1884-001	BODY, Relief	1
10	1881-001	POPPET, Relief	Not Sold Separately Order K-19002
11	1883-001†	RING, Piston	
12	2781-001	CHECK, Steel	1
13	1868-001	SPRING, Check	1
14	7874-001	SLEEVE, Dampening (Not to be used with 1450-001 and 1451-001 Springs)	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

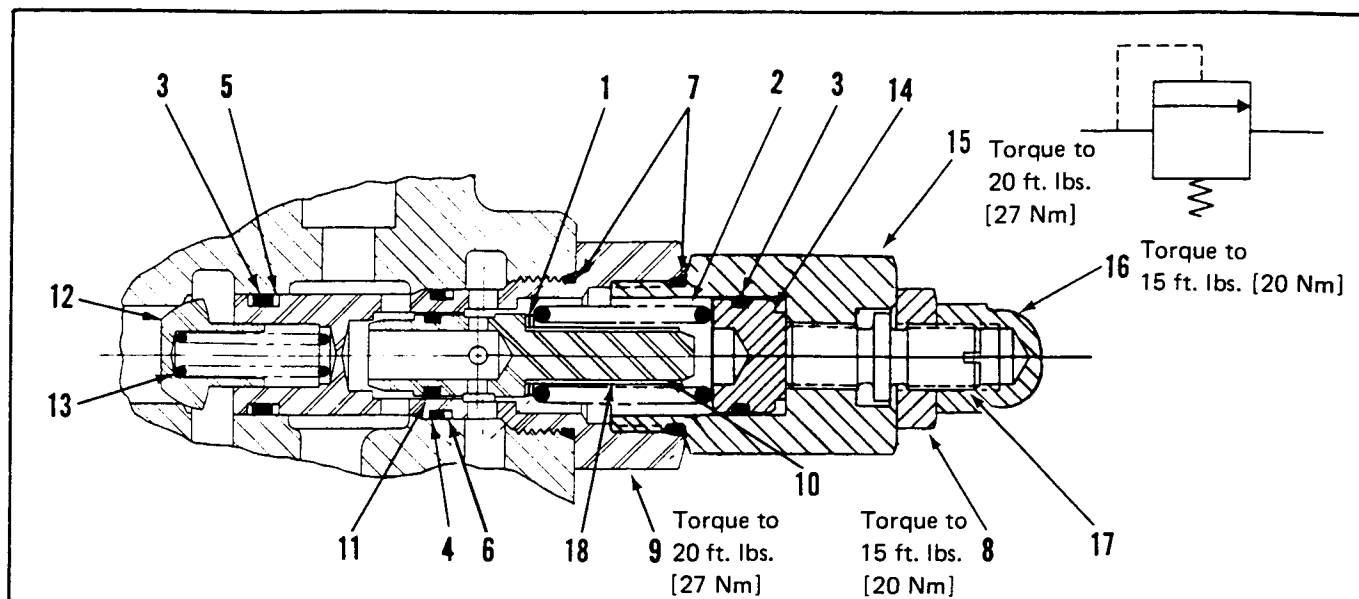


Figure 4-35. Optional RCA Relief Assembly.

OPTIONAL RCA RELIEF ASSEMBLY

All V20 Valves are machined to accept this assembly without modification. Simply remove load check assembly and install RCA combination.

Model RCA cannot be used on handle end of valve section with No. 1802-001 Vertical Handle due to interference.

Item No.	Part No.	Description	Quantity Per Relief
	K-19002	SERVICE KIT (Contains items 10 and 11)	
	K-6005A*	SEAL KIT (Contains all seals, items 3, 4, 5, 6 and 7)	
1	0458-001	SHIM (.040 inch [1,0 mm] thick)	A/R
	0459-001	SHIM (.020 inch [0,5 mm] thick)	A/R
	0462-001	SHIM (.010 inch [0,25 mm] thick)	A/R
2	7638-001	SPRING, S.S., 750-1500 PSI [52-103 bar]	1
	7078-001	SPRING, S.S., 1250-2000 PSI [86-138 bar]	1
	1870-001	SPRING, S.S., 1500-2500 PSI [103-172 bar]	1
	7497-001	SPRING, S.S., 2000-3000 PSI [138-207 bar]	1
3	1818-001*	SEAL, O-Ring	2
4	1819-001*	SEAL, O-Ring	1
5	1820-001	WASHER, Back-Up, Inner	2
6	1821-001	WASHER, Back-Up, Outer	1
7	2707-001*	SEAL, O-Ring	2
8	3500-001	NUT, Jam	1
9	1884-001	BODY, Relief	1
10	1881-001	POPPET, Relief	1
11	1883-001	RING, Piston	1
12	2781-001	CHECK, Steel	1
13	1868-001	SPRING, Check	1
14	11481-001	PISTON	1
15	3498-001	CAP, Adjustable Relief	1
16	3497-001	NUT, Acorn	1
17	3496-001	STEM, Adjustable	1
18	7874-001	SLEEVE, Dampening (Not to be used with 1450-001 or 1451-001 Springs)	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

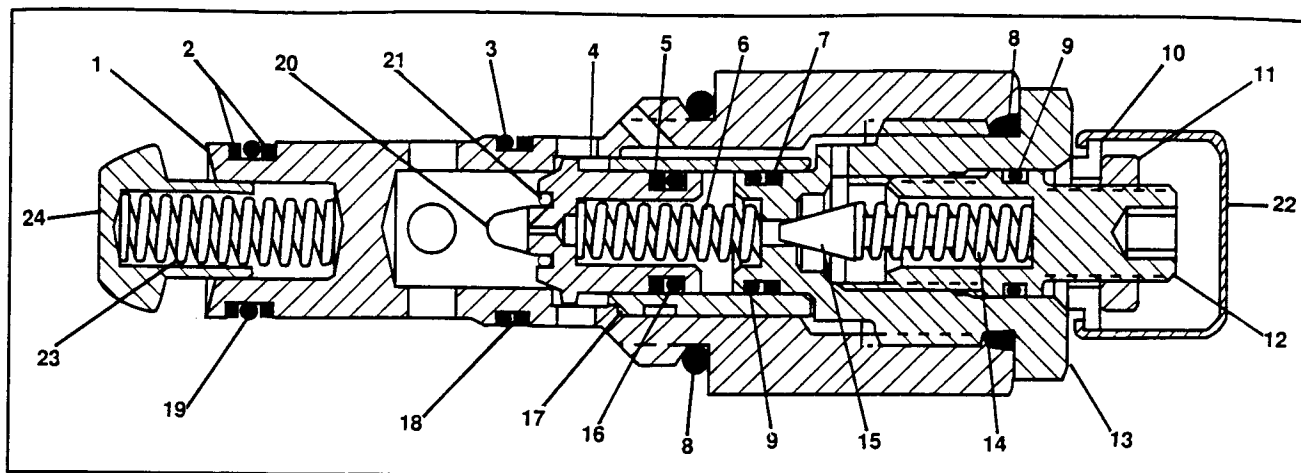


Figure 4-36. Optional RP 20-N Relief Assembly.

OPTIONAL RP 20-N CYLINDER PART RELIEF

All V20 valves are machined to accept this assembly without modification. Simply remove load check assembly and install RCA combination.

Item No.	Part No.	Description	Quantity Per Relief
	K-6192	SEAL KIT (Contains items 2, 3, 5, 7, 8, 9, 16, 18 and 19)	
1	20497-001	BODY, Relief	1
2	1820-001	RING, Back-Up	2
3	01819-001*	SEAL, O-Ring	1
4	20499-001	POPPET, Main	1
5	21581-001	RING, Back-Up	1
6	20503-001	SPRING	1
7	21582-001	RING, Back-Up	1
8	02707-001*	SEAL, O-Ring	2
9	09001-012*	SEAL, O-Ring	2
10	10035-001	WASHER	1
11	09302-006	NUT, Hex Jam	1
12	08956-001	SCREW, Adjustment	1
13	20500-001	BODY, Pilot	1
14	10059-001	SPRING	1
15	08475-001	POPPET, Relief	1
16	07830-001*	SEAL, O-Ring	1
17	20125-001	SLEEVE, Relief	1
18	01821-001	RING, Back-Up	1
19	01818-001*	SEAL, O-Ring	1
20	11839-001	SCREEN, Filter	1
21	11840-001	RING, Retaining	1
22	10034-001	COVER, Tamper Proof	1
23	01868-001	SPRING	1
24	02781-001	POPPET	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

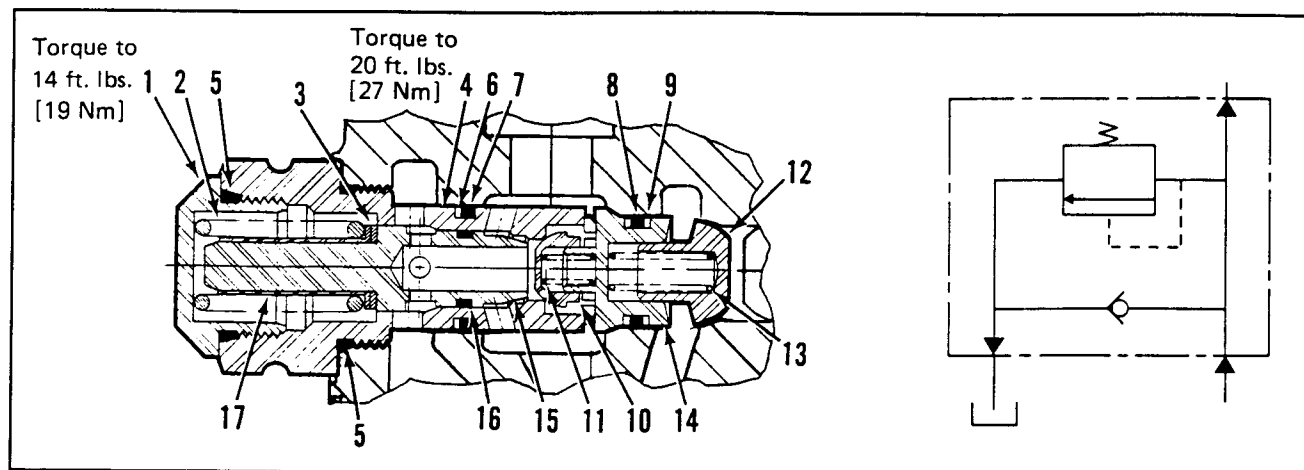


Figure 4-37. Optional Combination Relief and Anti-Cavitation Check Assembly (CRA)

OPTIONAL COMBINATION RELIEF and ANTI-CAVITATION CHECK ASSEMBLY (CRA)

All V20 Valves are machined to accept this assembly without modification. Simply remove load check assembly and install RCA combination.

Item No.	Part No.	Description	Quantity Per Relief
	K-19002	SERVICE KIT (Contains items 15 and 16)	
	K-6005A*	SEAL KIT (Contains items 5, 6, 7, 8 and 9)	
1	1880-001	CAP, Relief	1
2	1869-001	SPRING (500-1249 PSI [34-86 bar] Crack)	1
	7638-001	SPRING (1250-1749 PSI [86-121 bar] Crack)	1
	7078-001	SPRING (1750-1999 PSI [121-138 bar] Crack)	1
	1870-001	SPRING (2000-2599 PSI [138-179 bar] Crack)	1
3	0458-001	SHIM (.040 inch [1,0 mm] thick)	A/R
	0459-001	SHIM (.020 inch [0,5 mm] thick)	A/R
	0462-001	SHIM (.010 inch [0,25 mm] thick)	A/R
4	7741-001	BODY, Combination	1
5	2707-001*	SEAL, O-Ring	2
6	1821-001	WASHER, Back-Up Outer	Not Sold Separately Order K-6005A
7	1819-001*	SEAL, O-Ring	
8	1818-001*	SEAL, O-Ring	
9	1820-001	WASHER, Back-Up Inner	
10	7743-001	POPPET, Anti-Cavitation	1
11	7744-001	SPRING, Anti-Cavitation	1
12	6015-001	POPPET	See Note
13	6016-001	SPRING, Check	
14	7742-001	RETAINER, Poppet	1
15	1881-001	POPPET, Relief	Not Sold Separately Order K-19002
16	1883-001	RING, Piston	
17	7874-001	SLEEVE, Dampening (not to be used with 1450-001 or 1451-001 Springs)	1

Notes:

1. Replacement Model CRA Cartridge includes items 12 and 13. Specify pressure setting.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

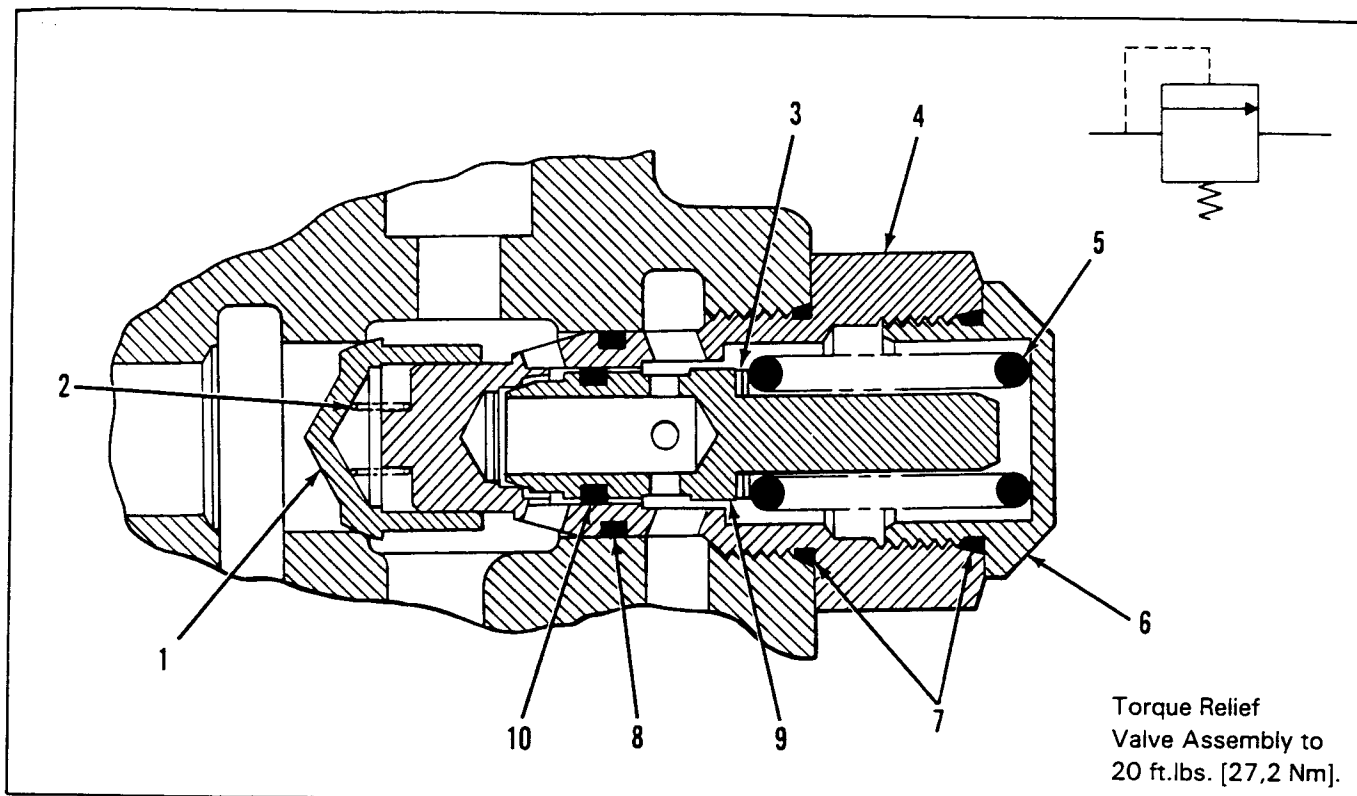


Figure 4-38. Optional V20S Work Port Relief. Model RCS (Non-Adjustable).

OPTIONAL V20S WORK PORT RELIEF, MODEL RCS (Non-Adjustable)

Item No.	Part No.	Description	Quantity Per Relief
	K-19002	SERVICE KIT (Contains items 9 and 10)	
	K-6206*	SEAL KIT (Contains items 7 and 8)	
1	11469-001	POPPET, Check	1
2	11470-001	SPRING, Check	1
3	0458-001	SHIM (.040 inch [1,0 mm] thick)	A/R
	0459-001	SHIM (.020 inch [0,5 mm] thick)	A/R
	0462-001	SHIM (.010 inch [0,25 mm] thick)	A/R
4	11471-001	BODY, RCS Relief	1
5	1869-001	SPRING (500-1249 PSI [35-86 bar] Crack)	1
	7638-001	SPRING (1250-1749 PSI [86-121 bar] Crack)	1
	7078-001	SPRING (1750-1999 PSI [121-138 bar] Crack)	1
	1870-001	SPRING (2000-2599 PSI [138-179 bar] Crack)	1
6	1880-001	CAP, Relief	1
7	2707-001*	SEAL, O-Ring	1
8	1819-001*	SEAL, O-Ring	1
9	1881-001	POPPET, Relief	1
10	1883-001	RING, Piston	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

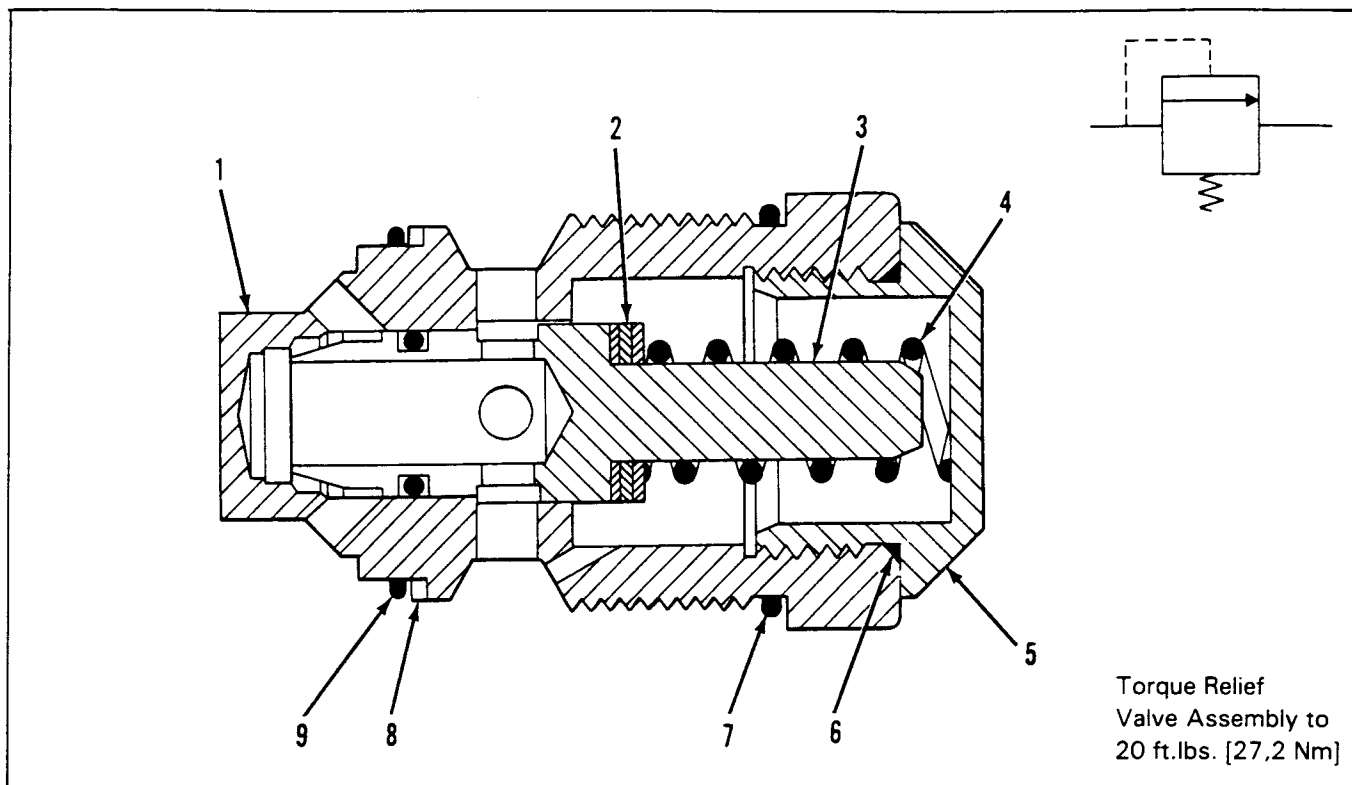


Figure 4-39. Model WH Differential Popper Main Relief Valve (Non-Adjustable).

MODEL WH DIFFERENTIAL POPPET MAIN RELIEF VALVE (Non-Adjustable)

Item No.	Part No.	Description	Quantity Per Relief
	K-19003-A*	SEAL KIT (Contains items 6 thru 9)	
1	6533-001	BODY, WH Relief	1
2	0458-001	SHIM (.040 inch [1,0 mm] thick)	A/R
	0459-001	SHIM (.020 inch [0,5 mm] thick)	A/R
	0462-001	SHIM (.010 inch [0,25 mm] thick)	A/R
3	3936-001	POPPET	1
4	1869-001	SPRING (500-1249 PSI [35-86 bar] Crack)	1
	7638-001	SPRING (1250-1749 PSI [86-121 bar] Crack)	1
	7078-001	SPRING (1750-1999 PSI [121-138 bar] Crack)	1
	1870-001	SPRING (2000-2599 PSI [138-179 bar] Crack)	1
5	1880-001	CAP, Relief	1
6	2707-001*	SEAL, O-Ring	1
7	1615-001*	SEAL, O-Ring	1
8	9020-022	RING, Back-Up	1
9	1718-001*	SEAL, O-Ring	1

Not sold
separately.
Order K-19003-A.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

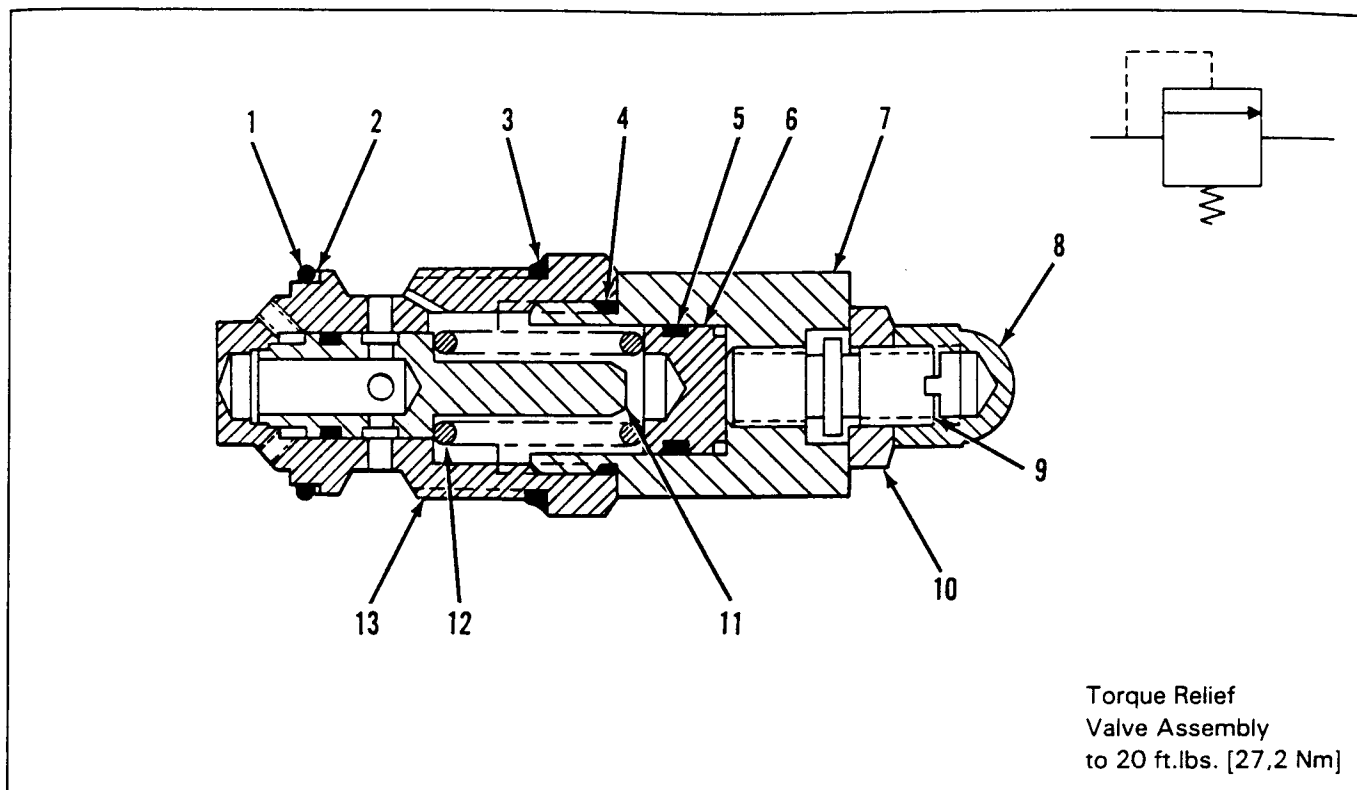


Figure 4-40. Model WHA Differential Poppet Main Relief Valve (Adjustable within the spring range).

MODEL WHA DIFFERENTIAL POPPET MAIN RELIEF VALVE (Adjustable within the spring range)

Item No.	Part No.	Description	Quantity Per Relief
	K-19012*	SEAL KIT (Contains items 1 thru 5)	
1	1718-001*	SEAL, O-Ring	1
2	9020-022	RING, Back-Up	1
3	1615-001*	SEAL, O-Ring	1
4	2707-001*	SEAL, O-Ring	1
5	1818-001*	SEAL, O-Ring	1
6	3495-001	PISTON	1
7	3498-001	CAP	1
8	3497-001	NUT, Acorn	1
9	3496-001	STEM, Adjusting	1
10	3500-001	NUT, Hex Jam	1
11	3936-001	POPPET	1
12	7638-001	SPRING, S.S., 750-1500 PSI [52-103 bar] Crack	1
	7078-001	SPRING, S.S., 1250-2000 PSI [86-138 bar] Crack	1
	1870-001	SPRING, S.S., 1500-2500 PSI [103-172 bar] Crack	1
	7497-001	SPRING, S.S., 2000-3000 PSI [138-207 bar] Crack	1
13	6533-001	BODY, WH Relief	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

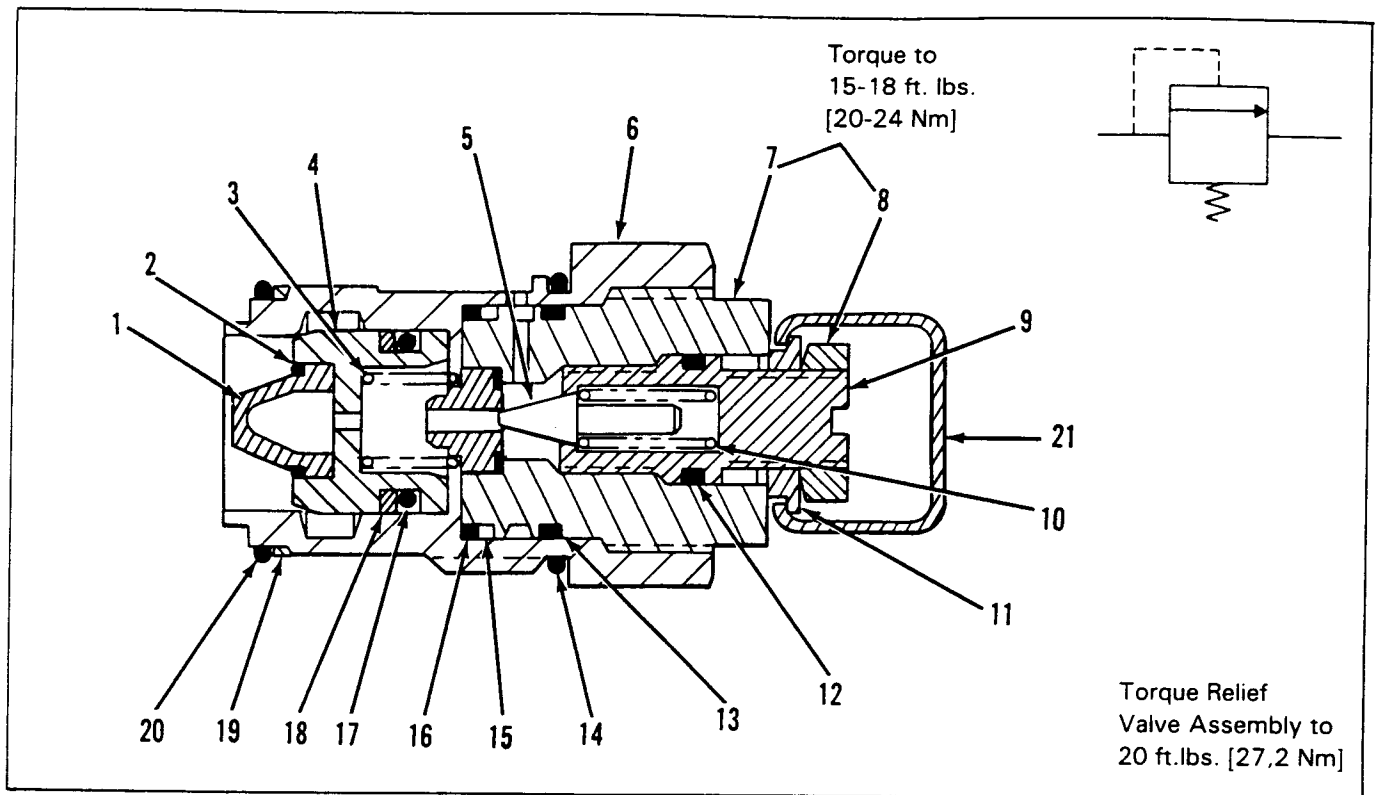


Figure 4-41. Model RP51 Pilot Operated Main Relief Valve.

MODEL RP51 PILOT OPERATED MAIN RELIEF VALVE

Item No.	Part No.	Description	Quantity
	K-19005*	SEAL KIT (Contains items 12-20)	
1	12675-001	FILTER	1
2	10298-001	RING, Retaining	1
3	20254-001	SPRING	1
4	20209-001	POPPET, Main	1
5	8475-001	POPPET, Relief	1
6	8954-001	BODY, Relief Valve	1
7	11059-001	BODY, Pilot Assembly	1
8	9302-006	NUT, Hex Jam	1
9	8956-001	SCREW, Adjustment	1
10	10059-001	SPRING, Pilot	1
11	10035-001	WASHER, RP51-N (Shown)	1
	10852-001	WASHER, ID, RP51-A (Not Shown)	1
12	6884-001*	SEAL, O-Ring	1
13	6814-002*	SEAL, O-Ring	1
14	1615-001*	SEAL, O-Ring	1
15	9020-019	RING, Back-Up	1
16	1660-001*	SEAL, O-Ring	1
17	9000-113*	SEAL, O-Ring	1
18	20903-001	RING, Back-Up	1
19	9020-022	RING, Back-Up	1
20	1718-001*	SEAL, O-Ring	1
21	10034-001	COVER, Tamperproof (RP51-N only)	1

Not sold
separately.
Order K-19005

NOTE

Due to close tolerances on working parts, Model RP51 is not field serviceable. If service other than seal replacement is required, contact the factory.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

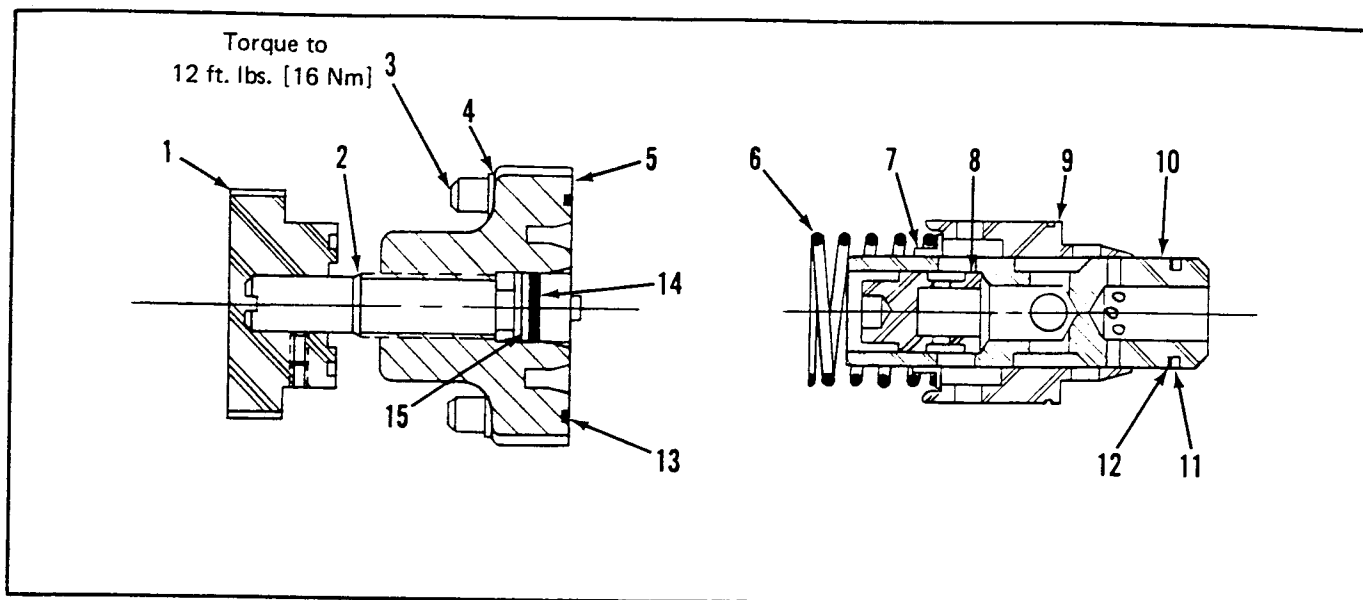


Figure 4-42. Flow Control Assembly, Inlet Cover.

FLOW CONTROL ASSEMBLY, INLET COVER

Item No.	Part No.	Description	Quantity
	K-6066-C	REPLACEMENT KIT, Actuator (Contains items 1 thru 5 and 13 thru 15)	
	K-6067-A	REPLACEMENT KIT, Flow Control, 3-16 GPM [11-60 litres/min]	
	K-6068-A	REPLACEMENT KIT, Flow Control, 8-25 GPM [30-95 litres/min]	
	K-6069-A	REPLACEMENT KIT, Flow Control, 13-21 GPM [49-79 litres/min]	
		(Flow Control Replacement Kits contain items 6 thru 12)	
	K-6065	SEAL KIT (Contains items 11 thru 15)	
1	3236-001	KNOB	1
2	6309-001	ADJUSTER, Flow (Standard)	1
	3902-001	ADJUSTER, Flow (Optional, 3-inch [76 mm] stem)	1
3	3731-101	SCREW, Hex Head	4
4	0563-001	WASHER, Lock	4
5	3906-001	CAP, Control	1
	3906-002	CAP, Control (For use with optional dust boot)	1
6	3882-001	SPRING, Control	1
7	6665-001	COLLAR	1
8	3897-001	PISTON, Control 3-16 GPM [11-60 litres/min]	1
	7740-001	PISTON, Control, 8-25 GPM [30-95 litres/min]	1
	7483-001	PISTON, Control, 13-21 GPM [49-79 litres/min]	1
9	3891-001	SLEEVE, Metering, 3-16 GPM [11-60 litres/min]	1
	7484-001	SLEEVE, Metering, 8-25 and 13-21 GPM [30-95 and 49-79 litres/min]	1
10	3888-001	GUIDE, Sleeve, 3-16 GPM [11-60 litres/min]	1
	7485-001	GUIDE, Sleeve, 8-25 and 13-21 GPM [30-95 and 49-79 litres/min]	1
11	1821-001	WASHER, Back-Up	1
12	1819-001*	SEAL, O-Ring	1
13	3911-001	SEAL, O-Ring	1
14	9001-012	SEAL, O-Ring	1
15	3908-001	WASHER, Back-Up	1
16	10957-001	BOOT (Not shown, cannot be used with knob)	1

See
Note

Not sold
separately.
Order K-6065

Note:

These are matched parts and are not sold separately. Order appropriate Replacement Kit for required GPM flow control.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

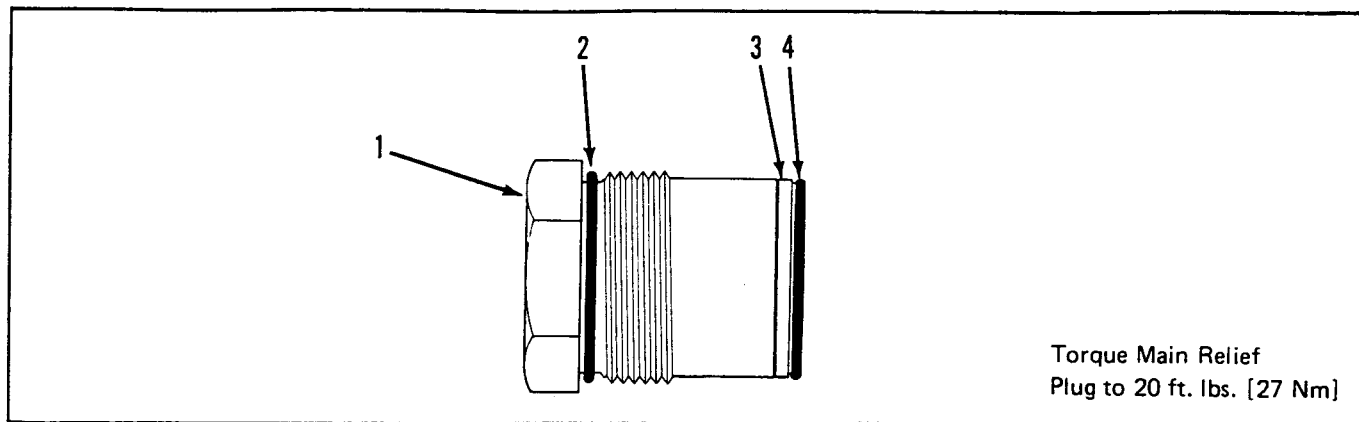


Figure 4-43. Main Relief Plug.

"NR" MAIN RELIEF PLUG

Item No.	Part No.	Description	Quantity
	K-6132-A	REPLACEMENT PLUG ASSEMBLY (Contains all items listed below)	
	K-28062-A	SEAL KIT (Contains items 2, 3 and 4)	
1	6760-001	PLUG, Relief	1
2	1615-001*	SEAL, O-Ring	1
3	9020-022	WASHER, Back-Up	1
4	1718-001	SEAL, O-Ring	1

} Not Sold Separately Order K-28062

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-37.

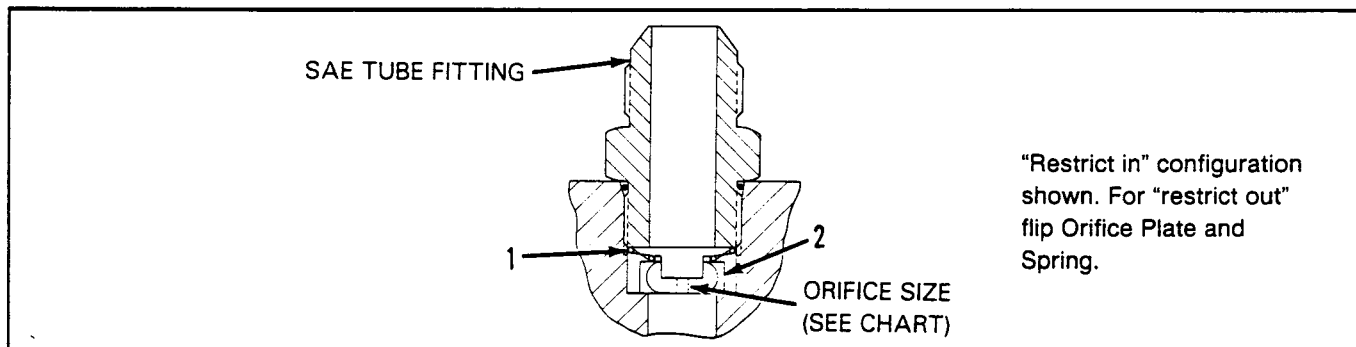


Figure 4-44. Work Port Restrictors.

WORK PORT RESTRICTORS

Item No.	Port No.	Description	Quantity
	11031-xxx*	RESTRICTOR ASSEMBLY, SAE 8 Port (Contains items 1 and 2)	
	10098-xxx*	RESTRICTOR ASSEMBLY, SAE 10 Port (Contains items 1 and 2)	
1	10821-001	SPRING, Conical (SAE 8 Port)	1
	10064-001	SPRING, Conical (SAE 10 Port)	1
2	10817-xxx*	PLATE, Orifice (SAE 8 Port)	1
	10063-xxx*	PLATE, Orifice (SAE 10 Port)	1

*The last three digits of the Restrictor Assembly and Orifice Plate part numbers are the same as the orifice hole size. Example: .062 hole is part number XXXXX-.062.

ORIFICE HOLE SIZES AVAILABLE

SAE 8 PORT	SAE 10 PORT
015, 028, 032, 046, 055, 062, 074, 082, 095, 109, 125, 141, 156, 172, 189, 220	015, 032, 037, 047, 053, 062, 070, 076, 082, 086, 095, 109, 125, 141, 156, 189, 203, 220, 281

Standard Buna-N Seals and O-Rings

All standard Gresen products utilize Buna-N seals which are compatible with petroleum base, water-in-oil emulsions, and water-glycol fluids. Phosphate ester type fire-resistant fluids will cause Buna-N seals to swell. This swelling is not normally detrimental to static seals, but will be a problem for dynamic seals such as valve spool seals. Swelling of these seals can result in binding. The temperature range of Buna-N seals is -40°F to +200°F [-40°C to +93°C].

Table 4-1. Cross Reference For Seals and O-Rings, Buna-N to Viton

Buna-N Part No.	Viton Part No.	Application
1129-001	None	
1615-001	7447-001	Section Seal, Exhaust
1718-001	7446-001	WC Relief, NR Plug
1721-001	7612-001	Power Beyond Sleeve, Inner
1800-001	None	
1818-001	7444-001	Inner Check Plug Seal
1819-001	7445-001	Outer Check Plug Seal
1853-001	7613-001	Quad Seal, Float
2706-001	None	
2707-001	7448-001	Check Plug Seal
2709-001	6277-001	Power Beyond Sleeve, Outer
6806-001	None	
21857-001	9003-117	Section Seal, Pressure (new)
6814-002	7450-001	Section Seal, Pressure (old)
21733-001	9002-119	Section Seal, Exhaust (new)
6815-002	7451-001	Section Seal, Exhaust (old)
21866-001	9002-108	Section Seal, Load Sensing (new)
8316-001	9002-011	Section Seal, Load Sensing (old)

Optional Viton Seals and O-Rings

Viton seals are recommended for most applications that use phosphate-ester type fluids. Viton seals are also recommended for applications that have a continuous operating temperature of +200°F [+93°C] or more.

Table 4-2. Cross Reference For Seal Kits, Buna-N to Viton

Buna-N Kit No.	Viton Kit No.	Application
K-6001-A	None	
K-6002-A	None	
K-6005-A	K-6041	RC Relief
K-6017-B	K-6053-A	Power Beyond (1/2 NPTF)
K-6018-B	K-6054-A	Power Beyond (SAE 8)
K-6019-B	K-6055-A	Power Beyond (SAE 10)
K-6021-A	K-6043	Anti-Cavitation Check
K-6027-A	K-6046	Section Seal, 3-Way, 4-Way
K-6028-C	K-6049-A	Section Seal, Float
K-6030-C	K-6047	Check Plug
K-6032	K-6041	Load Check, Anti-Cav. Check, RC Relief
K-6034-D	None	
K-6035-A	K-6048	Spool Seal
K-6039	None	
K-6040-C	None	

GRESEN



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